

WILD WORLD OF

ARGUS
Special
\$200

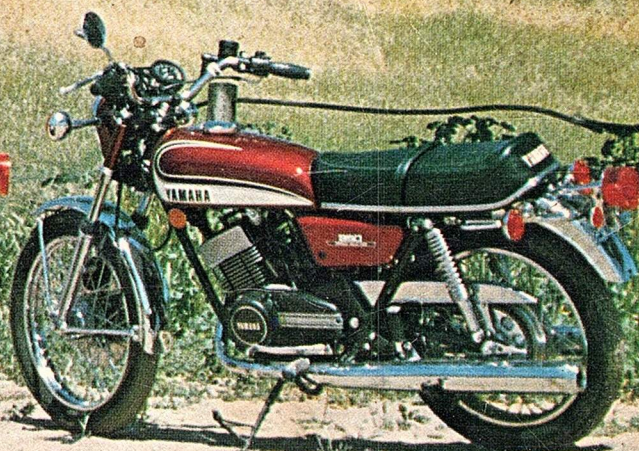
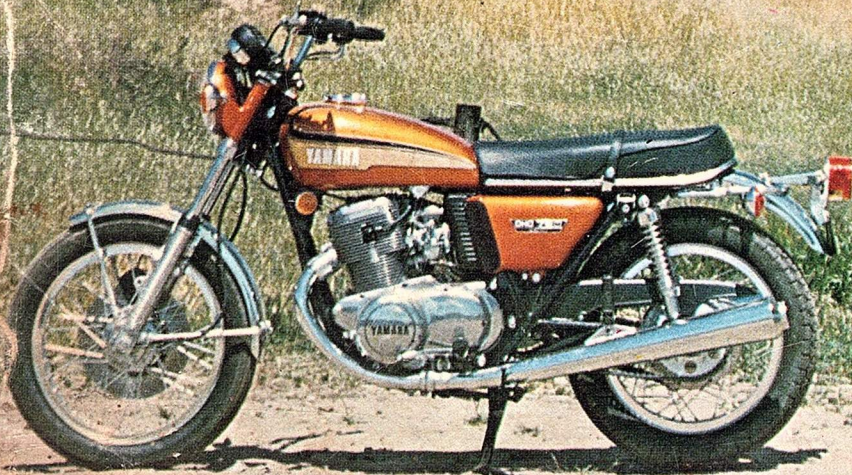
YAMAHA

EVERYTHING YOU NEED TO KNOW ABOUT YAMAHAS

**TESTS ON
STREET-TRAIL
& COMPETITION
MACHINES**

**SIMPLE TUNE-UPS
AND HOP-UPS
FOR ALL POPULAR
MODELS**

COMPLETE TECH DATA





POPULAR CYCLING'S WILD WORLD OF YAMAHA

AN ARGUS SPECIAL

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WILD WORLD OF YAMAHA/3

IS A YAMAHA?

WHAT

To most motorcycle enthusiasts, Yamaha is a name synonymous with motorcycles. Yamaha means big, solid road machines to some; agile road racers to others; and simple, inexpensive lightweights to a few. For every person who thinks of the Yamaha as a pavement machine, there is another who thinks of Yamaha as an off-road bike. In this book, we have tried to present a cross-section of the Yamaha motorcycles and provide useful information for Yamaha riders. Before we go too far, however, let's have a closer look at the company responsible for bringing the Yamaha motorcycle line to the world. You may find a few surprises.

Yamaha is not only a top name in the motorcycle field, but is a world leader in a number of other endeavors as well. Yamaha is widely known throughout the world as a maker of quality pianos, electronic organs, a complete line of band instruments, stereo components and speakers, fiberglass skis, and snowmobiles.

Tracing the story of Yamaha to the beginning, we must go back to the year 1887. Torakusu Yamaha was asked to repair an American organ at the Hamamatsu School in Japan. He became intrigued by the organ and decided to try his hand at manufacturing them. He formed a company that year to produce reed organs.

The Yamaha company expanded rapidly. In less than three years, Torakusu Yamaha's original reed organ company was re-organized under the name of Nippon Gakki Company, Ltd.

In 1900, the Nippon Gakki Company expanded operations to include the manufacture of pianos. From this small company, the Nippon Gakki Co. Ltd. grew to its position as the world's largest piano manufacturer, producing more than 120,000 pianos each year.

By the middle 1950's

there was a growing market for inexpensive, economical transportation in Japan. The Nippon Gakki Co. Ltd. established a subsidiary company, Yamaha Motor Company, Ltd., and began to produce motorcycles in 1955. Like the parent company, the newly formed Yamaha Motor Company grew quickly.

In 1960, a new subsidiary, Yamaha International Corp., was formed in the United States to sell Yamaha's motorcycles to the potentially big U.S. market. Since 1960, Yamaha International Corp. has been marketing the growing line of Yamaha products. The line of motorcycles from Yamaha has grown from a few lightweights to models for most special needs.

Actually the first Yamaha motorcycle brought into the United States was little more than a motorbike. This first machine was called the MF-1 and featured a step-through design, leading-link front suspension and widely valanced fenders.

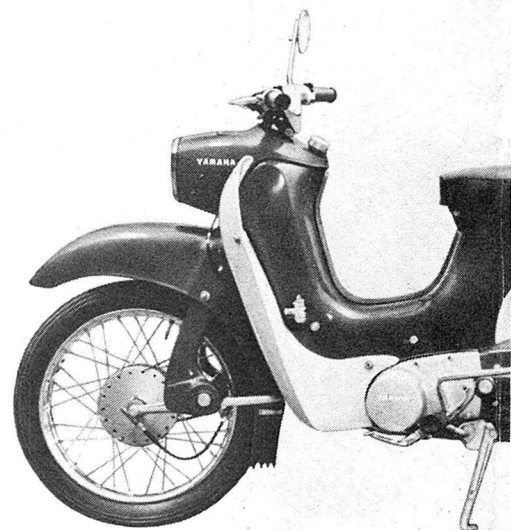
During the 1960's, Yamaha's YDS series became an extremely popular sports motorcycle line. The first of this line was the YDS-1. The 250cc YDS-1 became a standard for brisk performance and precise handling.

The success of the early YDS-1, as well as later models, served as a pattern for expansion into other facets of the motorcycle sport. In 1963 the first Yamaha dirt bike, called the "Ascot Scrambler," was introduced. Like the YDS machines, this bike was a two-stroke twin. Another two-stroke twin from Yamaha hit the motorcycle scene in 1964. The TD1, being the first production road racer in the United States, became almost legendary.

Many novice trail riders cut their teeth on the peppery little Yamaha 80, but by the late 1960's American riders were developing more sophisticated taste in off-road

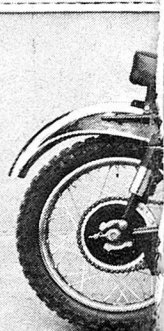
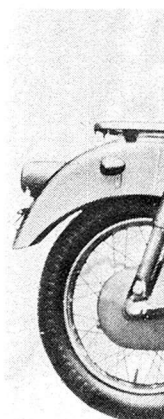
machinery. The Yamaha 250 Enduro shook the industry to the core. One motorcycle magazine reported, "Yamaha's Enduro will revolutionize the sport." The Enduro line, now expanded to include machines from 80cc through 360cc, has become an industry benchmark.

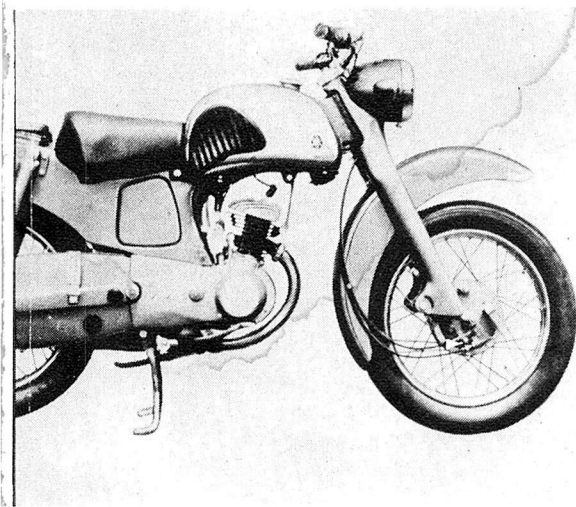
Since the introduction of the Enduro, Yamaha has gone on to strengthen its position in other areas of the motorcycle sport. In off-road competition, Yamaha has a full line of two-stroke equipment from the mini-



motocross to the awesome 500cc single. On the street, Yamaha has supplemented a potent line of two-stroke equipment with a series of four-stroke machines which began in late 1970 with the introduction of the dependable 650cc XS-1. Filling out that line, Yamaha gave riders a hot DOHC 500, and a very impressive 750 this year.

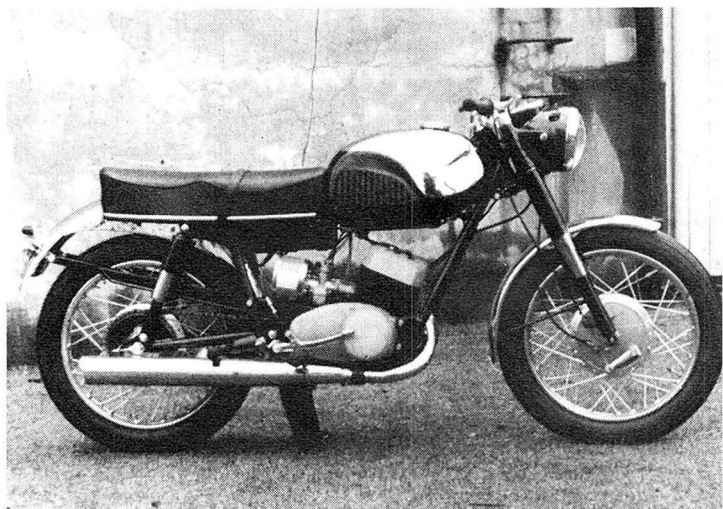
In another section the entire Yamaha field for 1973 has been outlined. A quick glance will reveal that there is something for everyone. Yamaha has come a long way from its modest beginnings and the motorcycle sport is the better for it.



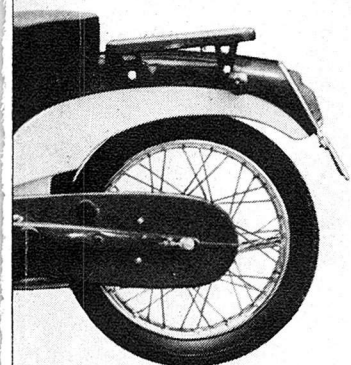


This early Yamaha shows some of the features of the time, including: deep valanced fenders, pressed steel frame, leading-link front suspension, and full chain covering.

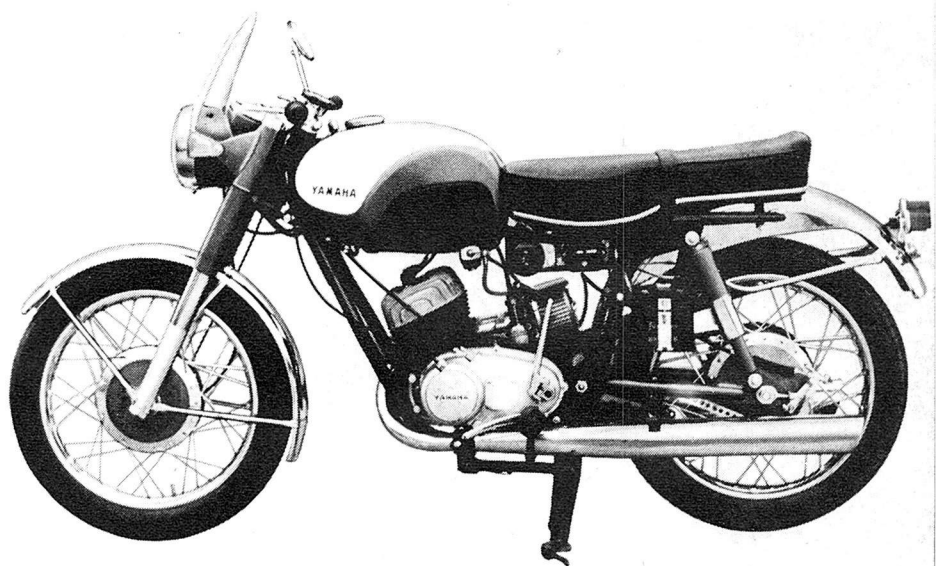
The first true "sports" 250 in the industry, Yamaha's YDS-1 produced 21 horsepower. Released in 1960, the YDS-1 revolutionized the concept of a street bike.



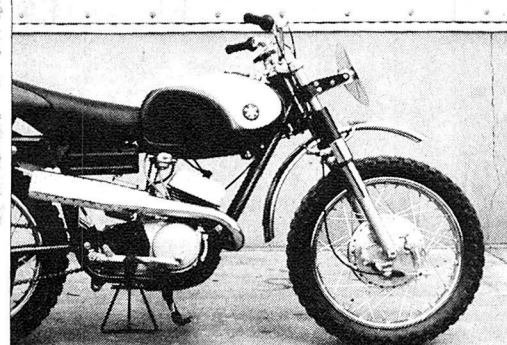
The MF-1 was the first Yamaha introduced into this country. The motorcycle sport has come a long way since 1959.



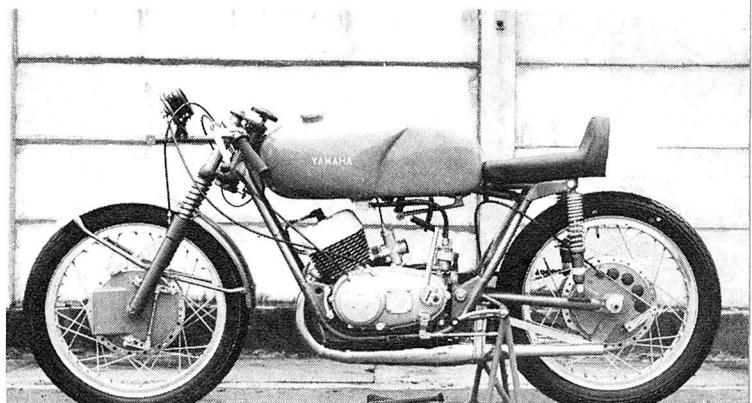
This 1963 Yamaha was the first five-speed, twin carbureted production machine in the U.S. Providing spirited performance, this machine would set the pattern for the years to come.



Yamaha turned their attention to off-road competition in 1963 with the introduction of the 250cc "Ascot Scrambler."



The first production road racer in the U.S., Yamaha's TD1 became a dominant factor in racing. A tradition that



DIMENSIONS

Overall length, in. 83.7
Overall width, in. 35.0
Overall height, in. 46.1
Wheelbase, in. 54.7
Min. Ground Clearance, in. 10.2
Weight (Net), lb. 262
Fuel Tank Capacity, gal. 2.5
Oil Tank Capacity, qt. 1.7

CHASSIS

Frame tube, double-cradle
Front Suspension telescopic fork
Front Fork Travel, in. 6.8
Caster 60°30'
Trail, in. 5.1
Rear Suspension swing arm
Tire Size,
 front 3.00-21-4PR
 rear 4.00-18-4PR

ELECTRICAL

Ignition System flywheel-magneto



DIMENSIONS

Overall length, in. 83.7
Overall width, in. 35.0
Overall height, in. 46.1
Wheelbase, in. 54.7
Min. Ground Clearance, in. 10.2
Weight (Net), lb. 258
Fuel Tank Capacity, gal. 2.5
Oil Tank Capacity, qt. 1.7

CHASSIS

Frame tube, double-cradle
Front Suspension telescopic fork
Front Fork Travel, in. 6.8
Caster 60°30'
Trail, in. 5.1
Rear Suspension swing arm
Tire Size,
 front 3.00-21-4PR
 rear 4.00-18-4PR

ELECTRICAL

Ignition System flywheel-magneto



DIMENSIONS

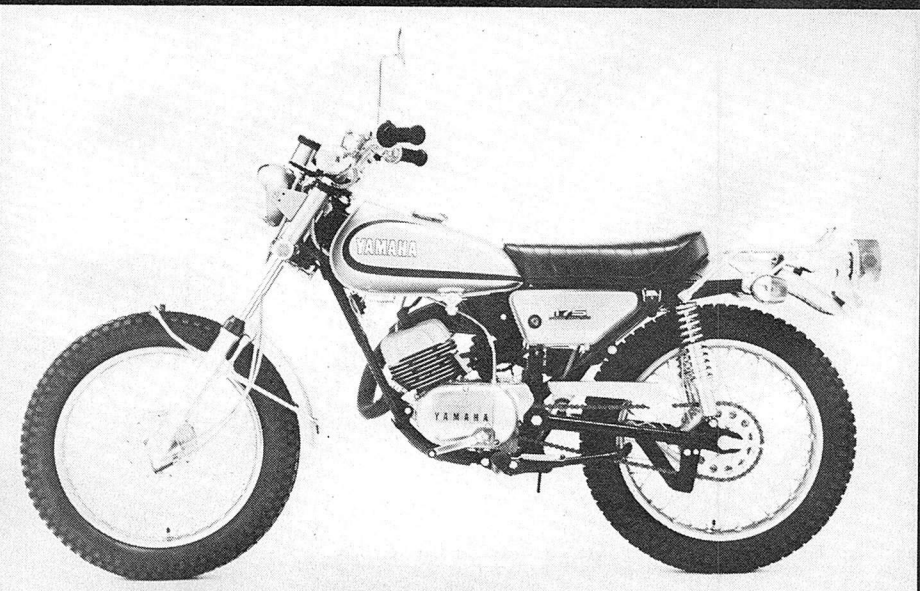
Overall length, in. 78.0
Overall width, in. 35.8
Overall height, in. 43.7
Wheelbase, in. 50.8
Min. Ground Clearance, in. 9.4
Weight (Net), lb. 221
Fuel Tank Capacity, gal. 1.85
Oil Tank Capacity, qt. 1.25

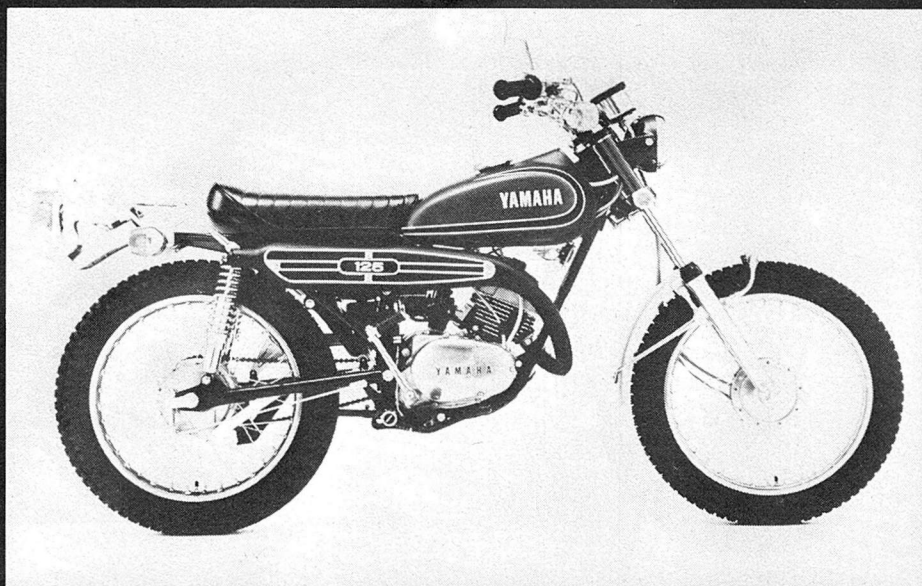
CHASSIS

Frame tube, double-cradle
Front Suspension telescopic fork
Front Fork Travel, in. 5.65
Caster 60°30'
Trail, in. 4.8
Rear Suspension swing arm
Tire Size,
 front 3.25-18-4PR
 rear 3.50-18-4PR

ELECTRICAL

Ignition System flywheel-magneto

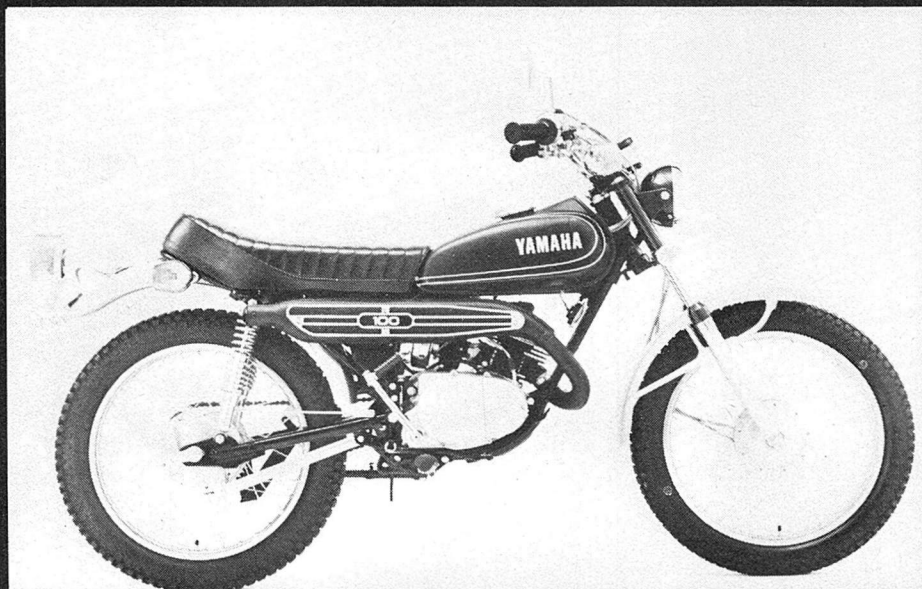




YAMAHA AT3

ENGINE

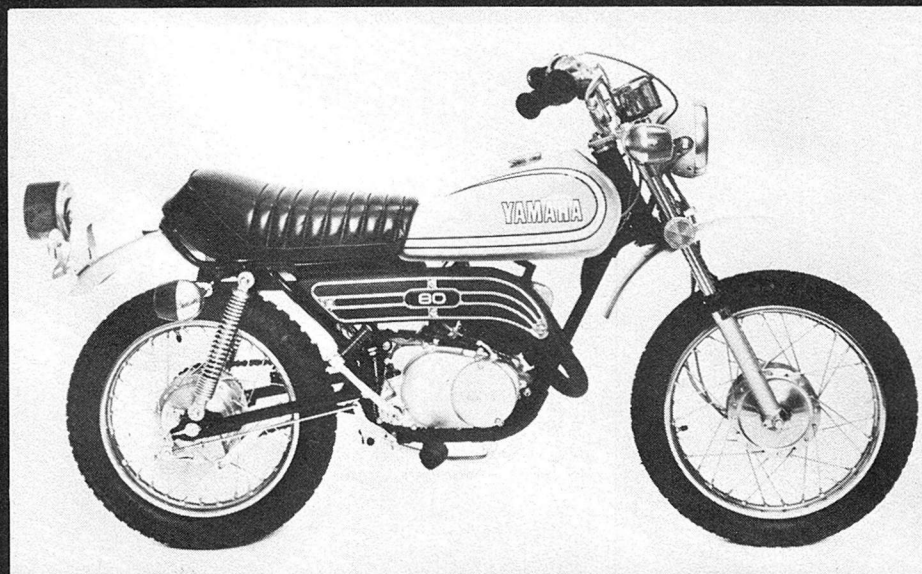
Type two-stroke, single seven-port, torque induction
 Displacement 123cc
 Bore and Stroke 56mm x 50mm
 Compression Ratio 7.1:1
 Lubrication System Autolube
 Starting System electric & kick start
 Transmission five-speed constant mesh
 Max. Horsepower 13 bhp @ 7000 rpm
 Max. Torque 9.69 ft/lb @ 6000 rpm
 Clutch wet, multi-disc
 Primary Reduction Ratio 3.894
 Secondary Reduction Ratio 3.000
 Trans. Gear Ratios
 1st 3.181
 2nd 2.000
 3rd 1.368
 4th 1.000
 5th 0.800
 Carburetor VM24SH, Mikuni
 Air Filter wet, foam rubber



YAMAHA LT3

ENGINE

Type two-stroke, single seven-port, torque induction
 Displacement 97cc
 Bore and Stroke 52mm x 45.6mm
 Compression Ratio 6.9:1
 Lubrication System Autolube
 Starting System primary kick start
 Transmission five-speed constant mesh
 Max. Horsepower 10 bhp @ 7500 rpm
 Max. Torque 6.8 ft/lb @ 7000 rpm
 Clutch wet, multi-disc
 Primary Reduction Ratio 3.894
 Secondary Reduction Ratio 3.500
 Trans. Gear Ratios
 1st 3.181
 2nd 2.000
 3rd 1.368
 4th 1.000
 5th 0.800
 Carburetor VM20SH, Mikuni
 Air Filter wet, foam rubber



YAMAHA GT1

ENGINE

Type two-stroke, single seven-port, torque induction
 Displacement 72cc
 Bore and Stroke 47mm x 42mm
 Compression Ratio 6.8:1
 Lubrication System Autolube
 Starting System primary kick start
 Transmission four-speed, constant mesh
 Max. Horsepower 4.9 @ 6500 rpm
 Max. Torque 4.0 ft/lb @ 6000 rpm
 Clutch wet, multi-disc
 Primary Reduction Ratio 3.57
 Secondary Reduction Ratio 2.928
 Trans. Gear Ratios
 1st 3.25
 2nd 2.00
 3rd 1.428
 4th 1.125
 Carburetor Y16P-3 Teikei
 Air Filter wet, foam rubber

DIMENSIONS

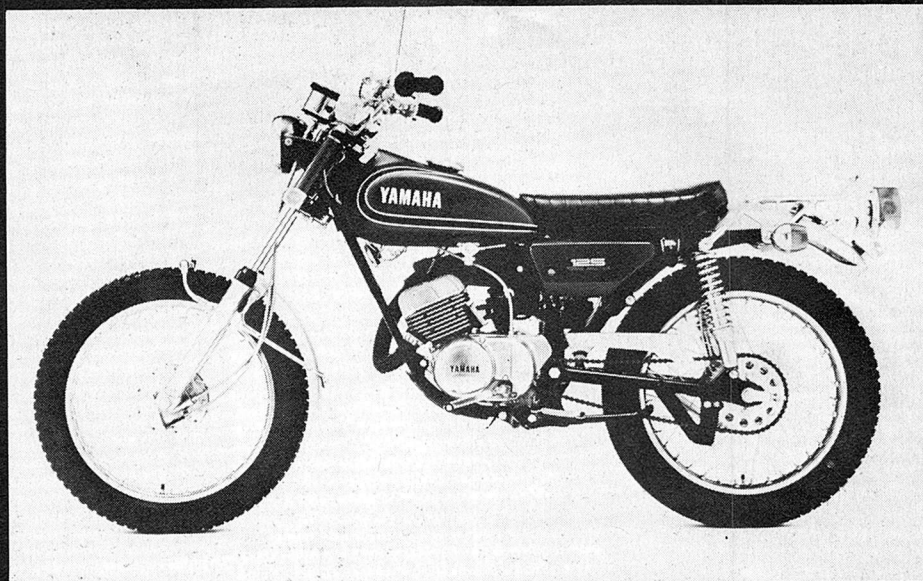
Overall length, in.	77.2
Overall width, in.	35.8
Overall height, in.	42.9
Wheelbase, in.	50.6
Min. Ground Clearance, in.	8.9
Weight (Net), lb.	214
Fuel Tank Capacity, gal.	1.85
Oil Tank Capacity, qt.	1.25

CHASSIS

Frame	tube, double-cradle
Front Suspension	telescopic fork
Front Fork Travel, in.	5.65
Caster	60°30'
Trail, in.	4.7
Rear Suspension	swing arm
Tire Size,	
front	3.00-18-4PR
rear	3.25-18-4PR

ELECTRICAL

Ignition System	flywheel-magneto
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DIMENSIONS

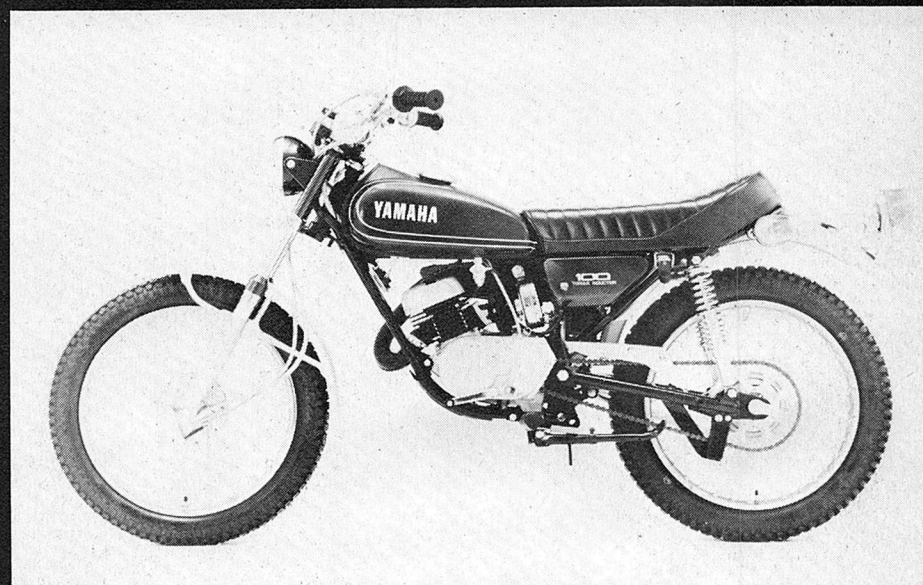
Overall length, in.	75.2
Overall width, in.	34.2
Overall height, in.	41.3
Wheelbase, in.	48.8
Min. Ground Clearance, in.	8.6
Weight (Net), lb.	187
Fuel Tank Capacity, gal.	1.6
Oil Tank Capacity, qt.	1.25

CHASSIS

Frame	tube, double-cradle
Front Suspension	telescopic fork
Front Fork Travel, in.	4.68
Caster, degrees	61
Trail, in.	4.1
Rear Suspension	swing arm
Tire Size,	
front	2.75-18-4PR
rear	3.00-18-4PR

ELECTRICAL

Ignition System	flywheel-magneto
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DIMENSIONS

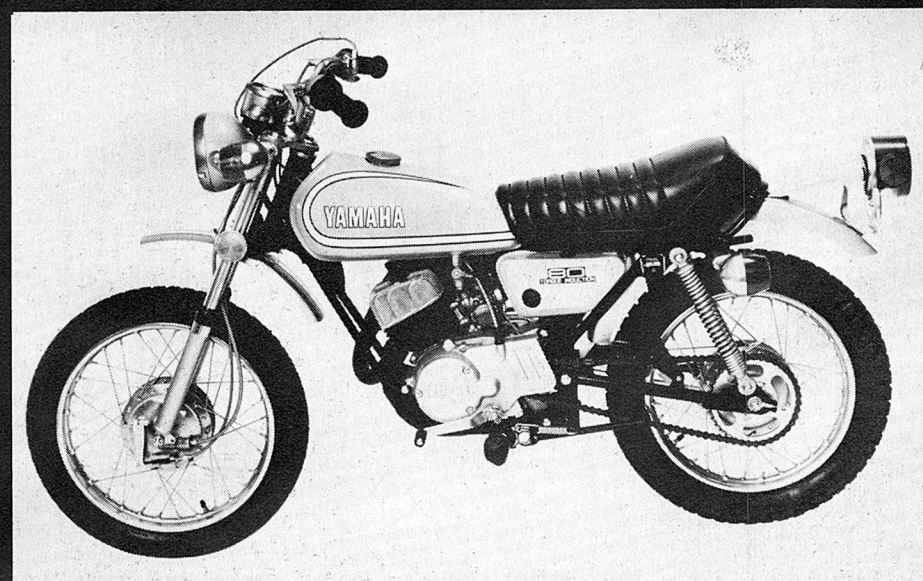
Overall length, in.	62.0
Overall width, in.	25.5
Overall height, in.	35.8
Wheelbase, in.	41.5
Min. Ground Clearance, in.	8
Weight (Net), lb.	141
Fuel Tank Capacity, gal.	1.3
Oil Tank Capacity, qt.	0.7

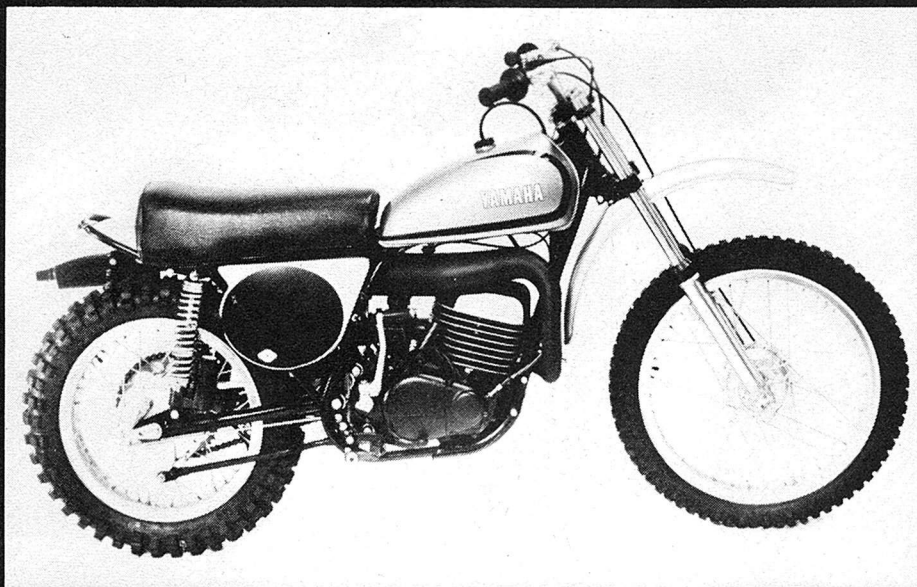
CHASSIS

Frame	tube, double-cradle
Front Suspension	telescopic fork
Front Fork Travel, in.	3.0
Caster, degrees	N/A
Trail, in.	N/A
Rear Suspension	swing arm
Tire Size	
front	2.50-15-4PR
rear	2.75-14-4PR

ELECTRICAL

Ignition System	flywheel-magneto
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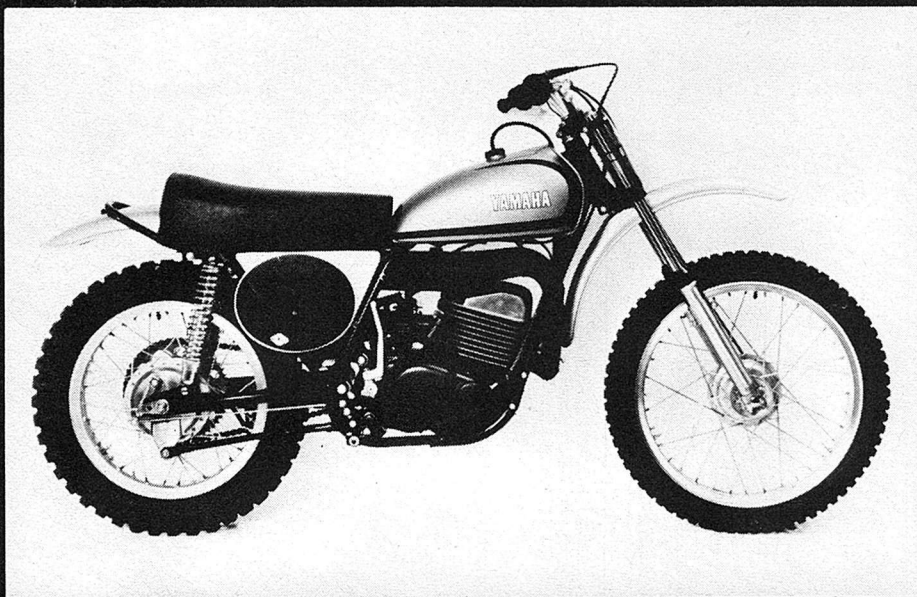




YAMAHA SC500

ENGINE

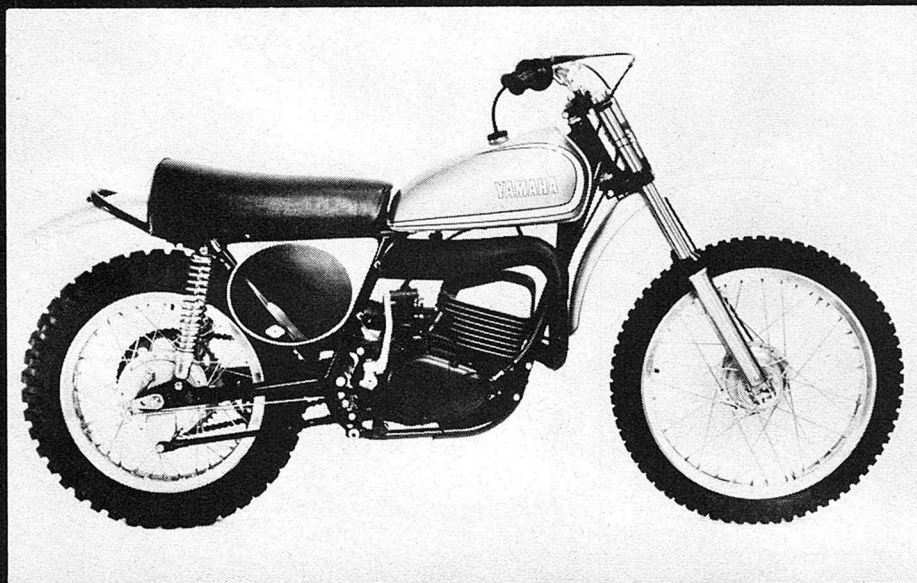
Type	two-stroke, single seven-port, torque induction
Displacement	496cc
Bore and Stroke	95mm x 70mm
Compression Ratio	N/A
Lubrication System	Autolube
Starting System	primary kick start
Transmission	four-speed constant mesh
Max. Horsepower	N/A
Max. Torque	N/A
Clutch	wet, multi-disc
Primary Reduction Ratio	2.667
Secondary Reduction Ratio	3.643
Trans Gear Ratios	
1st	2.000
2nd	1.368
3rd	1.000
4th	0.807
Carburetor	VM38SC, Mikuni
Air Filter	wet, foam rubber



YAMAHA MX360

ENGINE

Type	two-stroke, single seven-port, torque induction
Displacement	351cc
Bore and Stroke	80mm x 70mm
Compression Ratio	7.43:1
Lubrication System	Autolube
Starting System	primary kick start
Transmission	five-speed constant mesh
Max. Horsepower	N/A
Max. Torque	N/A
Clutch	wet, multi-disc
Primary Reduction Ratio	2.667
Secondary Reduction Ratio	3.643
Trans. Gear Ratios	
1st	2.250
2nd	1.650
3rd	1.261
4th	1.000
5th	0.793
Carburetor	VM34SC, Mikuni
Air Filter	wet, foam rubber



YAMAHA MX250

ENGINE

Type	two-stroke, single seven-port, torque induction
Displacement	246cc
Bore and Stroke	70mm x 64mm
Compression Ratio	7.05:1
Lubrication System	Autolube
Starting System	primary kick start
Transmission	five-speed, constant mesh
Max. Horsepower	N/A
Max. Torque	N/A
Clutch	wet, multi-disc
Primary Reduction Ratio	2.739
Secondary Reduction Ratio	3.643
Trans. Gear Ratios	
1st	2.250
2nd	1.650
3rd	1.261
4th	1.000
5th	0.793
Carburetor	VM30SC, Mikuni
Air Filter	wet, foam rubber

DIMENSIONS

Overall length, in.	83.1
Overall width, in.	37.4
Overall height, in.	44.5
Wheelbase, in.	55.9
Min. Ground Clearance, in.	8.8
Weight (Net), lb.	236
Fuel Tank Capacity, gal.	2.4
Oil Tank Capacity, qt.	0.69

CHASSIS

Frame	tube, double-cradle
Front Suspension	telescopic fork
Front Fork Travel, in.	7.52
Caster, degrees	60
Trail, in.	4.93
Rear Suspension	swing arm
Tire Size	
front	3.00-21-4PR
rear	4.60-18-4PR

ELECTRICAL

Ignition System	C.D.I. flywheel-magneto
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DIMENSIONS

Overall length, in.	83.1
Overall width, in.	37.4
Overall height, in.	44.5
Wheelbase, in.	55.9
Min. Ground clearance, in.	8.8
Weight (Net), lb.	234
Fuel Tank Capacity, gal.	2.4
Oil Tank Capacity, qt.	0.69

CHASSIS

Frame	tube, double-cradle
Front Suspension	telescopic fork
Front Fork Travel, in.	6.8
Caster, degrees	59
Trail, in.	5.5
Rear Suspension	swing arm
Tire Size	
front	3.00-21-4PR
rear	4.00-18-4PR

ELECTRICAL

Ignition System	C.D.I.
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DIMENSIONS

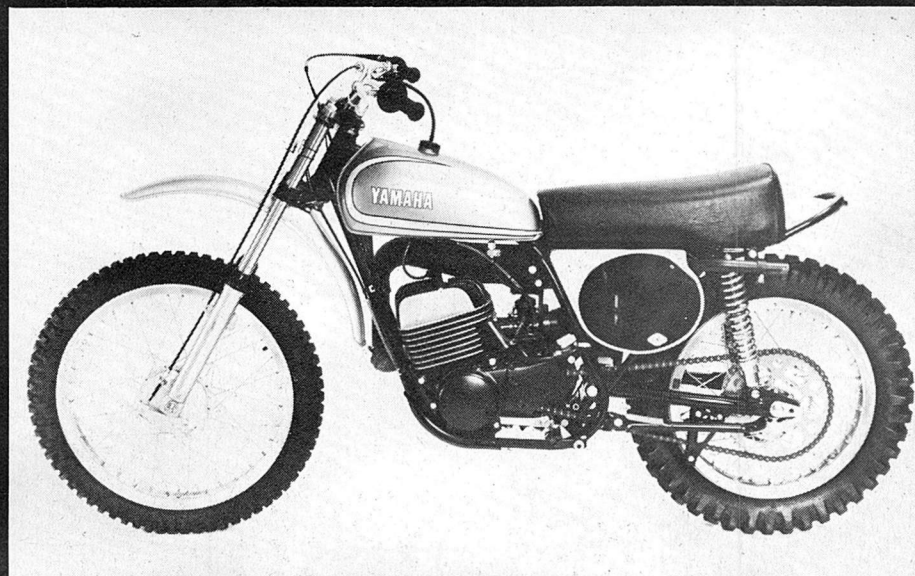
Overall length, in.	83.1
Overall width, in.	37.4
Overall height, in.	44.5
Wheelbase, in.	55.9
Min. Ground Clearance, in.	8.8
Weight (Net), lb.	227
Fuel Tank Capacity, gal.	2.4
Oil Tank Capacity, qt.	0.69

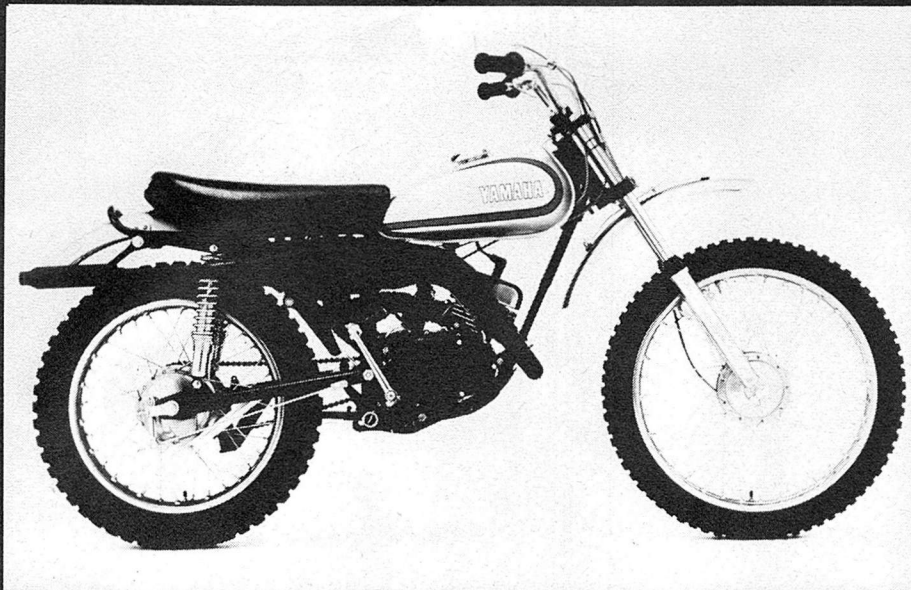
CHASSIS

Frame	tube, double-cradle
Front Suspension	telescopic fork
Front Fork Travel	N/A
Caster, degrees	59
Trail, in.	5.5
Rear Suspension	swing arm
Tire Size	
front	3.00-21-4PR
rear	4.00-18-4PR

ELECTRICAL

Ignition System	flywheel-magneto
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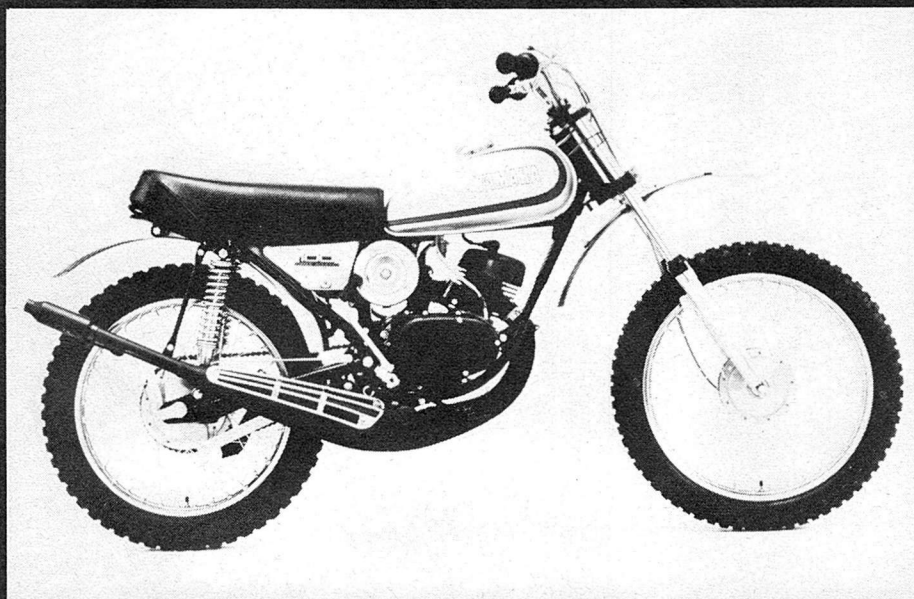




YAMAHA AT3MX

ENGINE

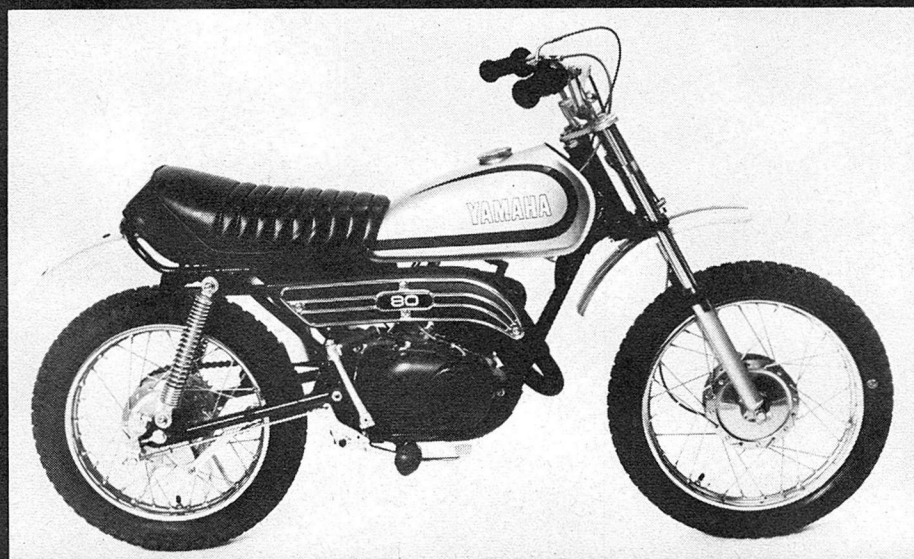
Type two-stroke, single seven-port, torque induction
 Displacement 123cc
 Bore and Stroke 56mm x 50mm
 Compression Ratio 7.8:1
 Lubrication System Autolube
 Starting System primary kick start
 Transmission five-speed
 constant mesh
 Max. Horsepower 20 bhp @ 8500 rpm
 Max. Torque 11.93 ft/lb @ 8000 rpm
 Clutch wet, multi-disc
 Primary Reduction Ratio 3.894
 Secondary Reduction Ratio 3.214
 Trans. Gear Ratios
 1st 2.833
 2nd 1.875
 3rd 1.368
 4th 1.091
 5th 0.956
 Carburetor VM26SC, Mikuni
 Air Filter wet, foam rubber



YAMAHA LT3MX

ENGINE

Type two-stroke, single seven-port, torque induction
 Displacement 97cc
 Bore and Stroke 52mm x 45.6mm
 Compression Ratio 7.8:1
 Lubrication System Autolube
 Starting System primary kick start
 Transmission five-speed
 constant mesh
 Max. Horsepower 16 bhp @ 10,500 rpm
 Max. Torque 7.8 ft/lb @ 9500 rpm
 Clutch wet, multi-disc
 Primary Reduction Ratio 3.894
 Secondary Reduction Ratio 3.714
 Trans. Gear Ratios
 1st 2.833
 2nd 1.875
 3rd 1.368
 4th 1.090
 5th 0.956
 Carburetor VM26SC, Mikuni
 Air Filter wet, foam rubber



YAMAHA GT1MX

ENGINE

Type two-stroke, single seven-port, torque induction
 Displacement 72cc
 Bore and Stroke 47mm x 42mm
 Compression Ratio 6.8:1
 Lubrication System Autolube
 Starting System primary kick start
 Transmission four-speed,
 constant mesh
 Max. Horsepower 4.9 @ 6500 rpm
 Max. Torque 4.0 ft/lb @ 6000 rpm
 Clutch wet, multi-disc
 Primary Reduction Ratio 3.758
 Secondary Reduction Ratio 2.928
 Trans. Gear Ratios
 1st 3.250
 2nd 2.000
 3rd 1.428
 4th 1.125
 Carburetor 16mm Teikei
 Air Filter wet, foam rubber

DIMENSIONS

Overall length, in.	77.4
Overall width, in.	35.9
Overall height, in.	44.1
Wheelbase, in.	50.8
Min. Ground Clearance, in.	9.4
Weight (Net), lb.	202
Fuel Tank Capacity, gal.	1.85
Oil Tank Capacity, qt.	1.3

CHASSIS

Frame	tube, double-cradle
Front Suspension	telescopic fork
Front Fork Travel, in.	5.65
Caster	60°30'
Trail, in.	5.4
Rear Suspension	swing arm
Tire Size,	
front	2.75-21-4PR
rear	3.50-18-4PR

ELECTRICAL

Ignition System	flywheel-magneto
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DIMENSIONS

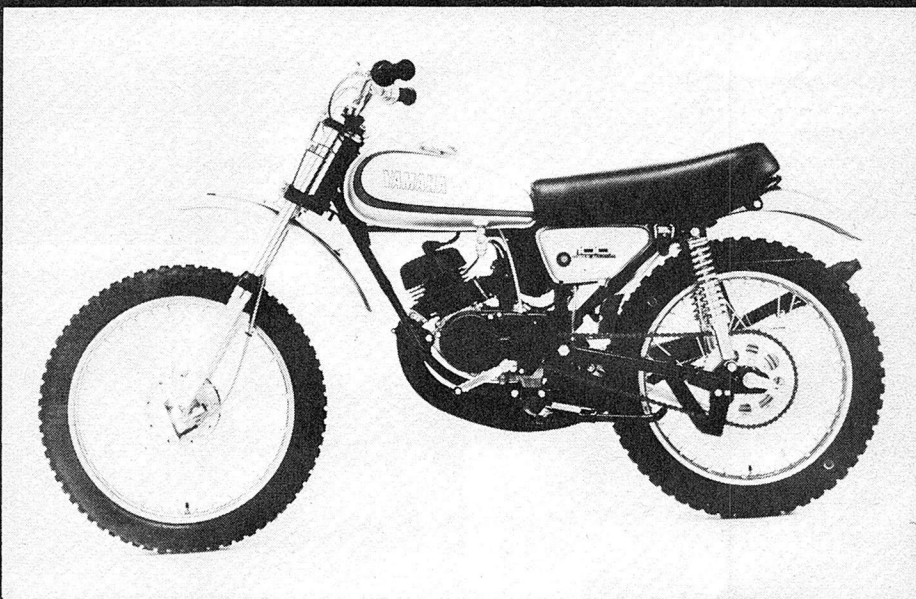
Overall length, in.	74.0
Overall width, in.	34.2
Overall height, in.	42.5
Wheelbase, in.	49.6
Min. Ground Clearance, in.	8.3
Weight (Net), lb.	185
Fuel Tank Capacity, gal.	1.6
Oil Tank Capacity, qt.	1.3

CHASSIS

Frame	tube, double-cradle
Front Suspension	telescopic fork
Front Fork Travel, in.	5.65
Caster, degrees	59
Trail, in.	5.2
Rear Suspension	swing arm
Tire Size,	
front	2.75-19-4PR
rear	3.00-18-4PR

ELECTRICAL

Ignition System	flywheel-magneto
-----------------------	------------------



DIMENSIONS

Overall length, in.	64.5
Overall width, in.	N/A
Overall height, in.	35.8
Wheelbase, in.	41.8
Min. Ground Clearance, in.	8.0
Weight (Net), lb.	130
Fuel Tank Capacity, gal.	1.3
Oil Tank Capacity, qt.	0.7

CHASSIS

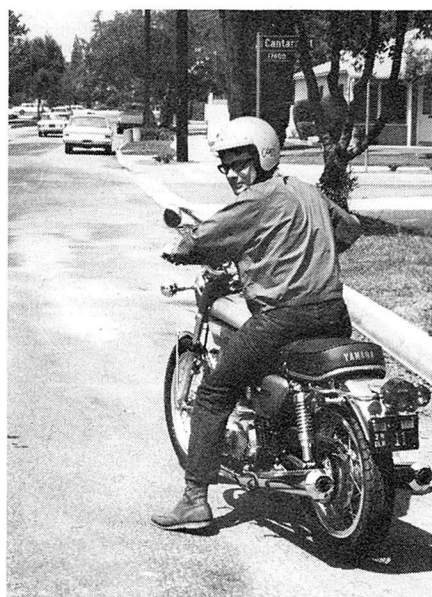
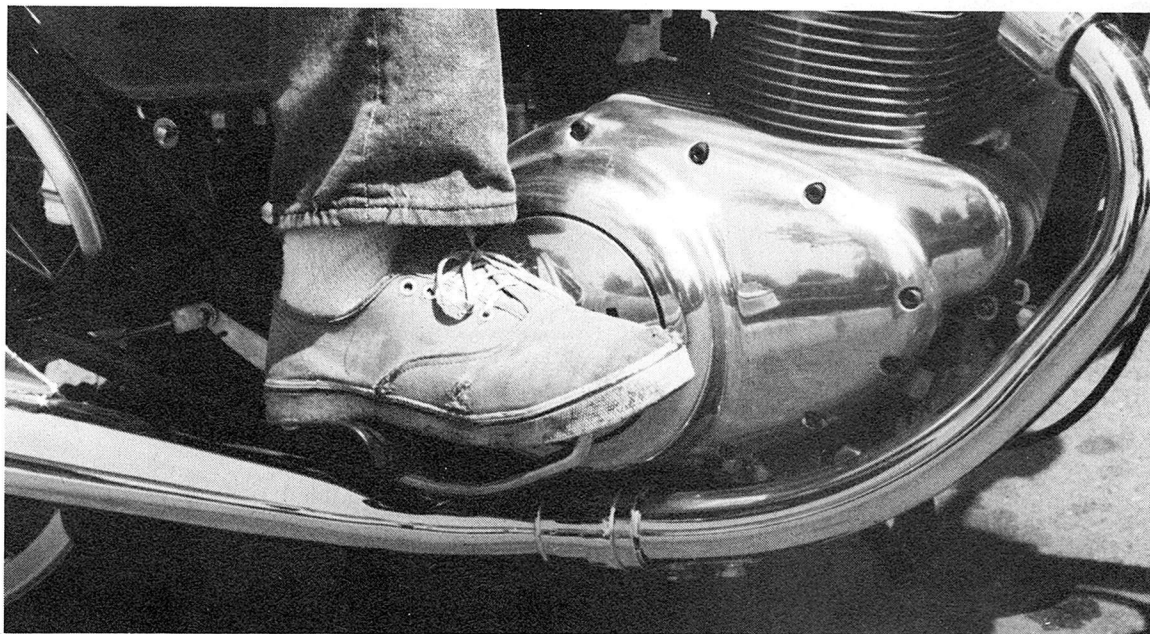
Frame	tube, double-cradle
Front Suspension	telescopic fork
Front Fork Travel, in.	3.0
Caster, degrees	N/A
Trail, in.	N/A
Rear Suspension	swing arm
Tire Size	
front	2.50-15-4PR
rear	2.75-14-4PR

ELECTRICAL

Ignition System	flywheel-magneto
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An old pair of tennis shoes is not the best footwear for safety purposes. They offer little protection for your feet.



When pulling away from a curb, never rely on your rearview mirror alone. Take an extra second to turn around and look.

The proper riding attire is important for safety on the street. A good helmet, along with protection for your eyes is a must.



RIDE THE STREET AND

HERE ARE A FEW TIPS TO MAKE STREET RIDING SAFER.

The proper clothing is necessary for a safe ride. Always wear a good helmet, being sure that it fits properly. Gloves and a jacket or long-sleeved shirt are also not a bad idea. Tennis shoes and other clothing which offer little or no protection should be avoided in favor of sturdier apparel. Eye protection is imperative. Wear goggles or glasses.

Next, learn how to operate the machine so that you don't need to think about the various motions you have to go through. Some riders who have been riding long enough to know better haven't completely mastered the fundamentals. Stopping is a perfect example. Far too few riders know how to stop correctly and effectively.

SURVIVE

Street riding can be an enjoyable pastime and a practical, economical means of daily transportation. If you ride the street, however, you are undoubtedly aware of the accident statistics. Most accidents involving motorcycles are not the fault of the rider, technically. But this fact won't ease the pain if you should get nailed.

Street riding, however, doesn't have to be quite as dangerous for a skilled, alert rider. We've assembled this article to help you become a safe rider.

First, you need a safe motorcycle. Regular maintenance is an important part of motorcycle safety. Keeping your machine in good working shape will provide an extra margin of safety the next time an emergency occurs.

For stopping, use the engine to slow down. Downshift to lower gears as your speed decreases. Second, you have two brakes; use them. Don't be afraid to put pressure on the front brake. However, the front brake should not be used when the motorcycle is leaned over sharply or when the front wheel is turned at an extreme angle and the footing is not solid. Under all other conditions, the front brake is much safer than the rear and is actually less likely to put your machine out of control.

Once you know how to conduct yourself on the machine with ease, there are two types of hazards to constantly be aware of. First and most dangerous is the hazard of automobiles and other vehicles. Second are the hazards of the road surface itself. Road conditions that automobile drivers may not even be aware of may be more than you can handle on a motorcycle.

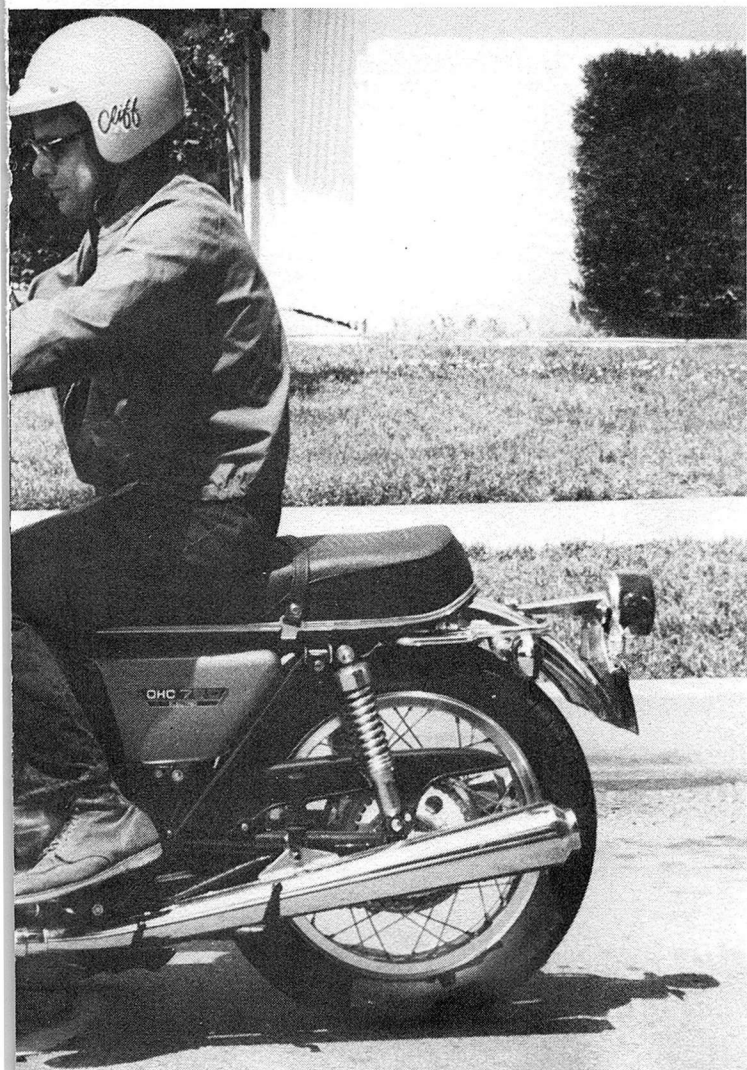
There are a few other hazards which will always give you a bit of trouble and you should be on the lookout for them. Water is the most common of these natural troublemakers. Remember also that just because you are through the water, you are not home safe. Your tires may stay wet for several feet after leaving the water. Another hazard is the traffic line paint, which is usually more slippery than the normal road surface. When the stripes become damp, they are like little patches of ice. Manhole covers and wet patches of leaves are also hazards that can cause spills.

As far as other traffic is concerned, try to anticipate what the other guy is thinking, where he may go, and when. Make sure that you are seen by others in the traffic pattern. Ride prominently in the lane, not between the lanes or off to the side of the roadway. Keep a reasonable distance from the cars in front of you and don't let the car in the rear get too close.

Give yourself every margin of safety that you can by keeping a sharp eye open. For example, when approaching an intersection, glance at the pedestrian signal as well as your own to get a better idea of what is going on.

Riding double can be fun, but dangerous as well. Remember that a single passenger really makes a difference in the weight of the load and that your braking distance is increased greatly. Also other handling characteristics are greatly changed.

We have tried to illustrate some of the primary riding hazards, although we can't hope to cover them all. Most important, be aware of the types of hazards that do exist and how to avoid them. Dress properly; keep your head in gear; keep your mind on what you're doing; and make your presence known to other vehicles. Motorcycle safety isn't something that just happens. It's something that you make happen. You have to continuously work at it if you want to ride the street and survive.



When waiting for a signal to change, slip the transmission into neutral rather than holding the clutch in. This is also easier on your hands.

Beware of blind alleys. Never come shooting out of an alley when you can't see both the crossing vehicle or pedestrian traffic.



Be careful of the driver who swings left before turning right. If you get too anxious to pass, that's exactly how you may be stopped cold.



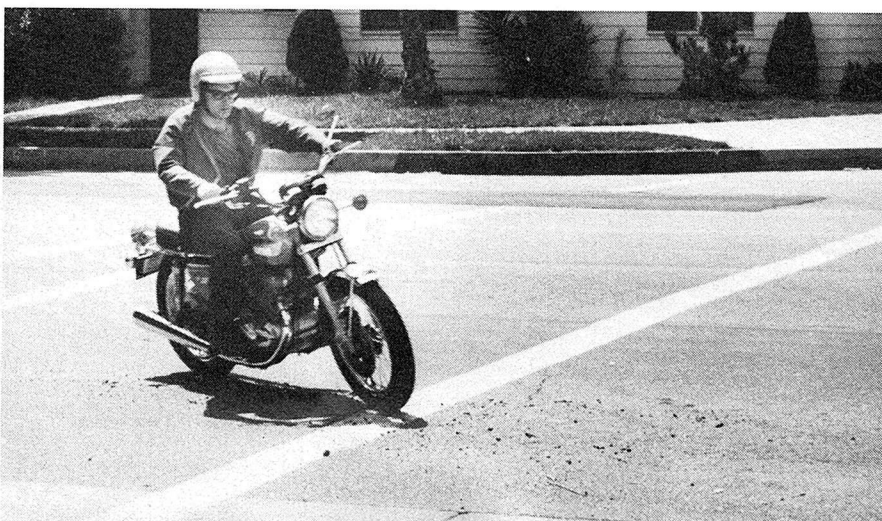


Never ride too close to a line of parked cars. A door that swings open unexpectedly can result in a serious accident if you are unable to avoid it.

When following automobile traffic, keep a safe distance and be prepared for the unexpected. Your safest and most visible place is toward the left side of the lane.



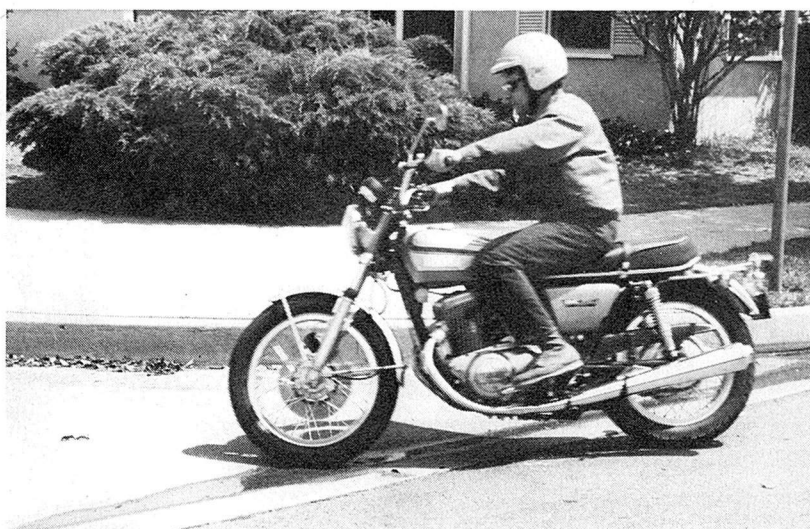
The right rear corner of most automobiles is a blind spot for the driver. If you want to enjoy a long, safe life of street riding, avoid this area.



Always keep your eyes open for dangerous road conditions. Heavy street markings combined with loose gravel make this corner a potential hazard for the unprepared.

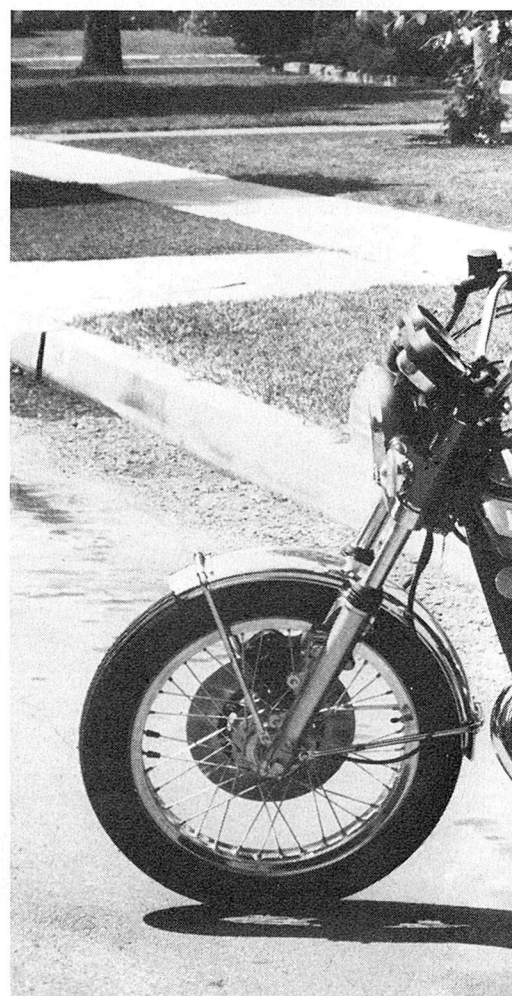
Chuckholes, especially in the middle of corners, can be a serious problem if you hit them wrong.

Riding double can be fun if you do it correctly. The passenger should always wear a helmet and have a firm hold so that he does not move independently of the motorcycle.



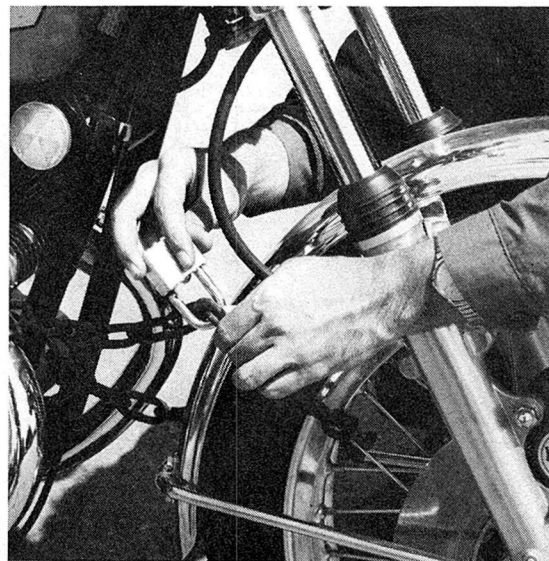
Water is always a potential hazard. A little water, especially if it has been standing in the same place for a long period of time, can cause a very slippery spot.

Innocent objects such as a common manhole cover can create problems if you are not careful. The top of this cover is polished smooth by years of traffic.





Beware of leaves, particularly in gutters where they may be thoroughly soaked by water. You might run into this mixture if you make a habit of cutting corners too close.



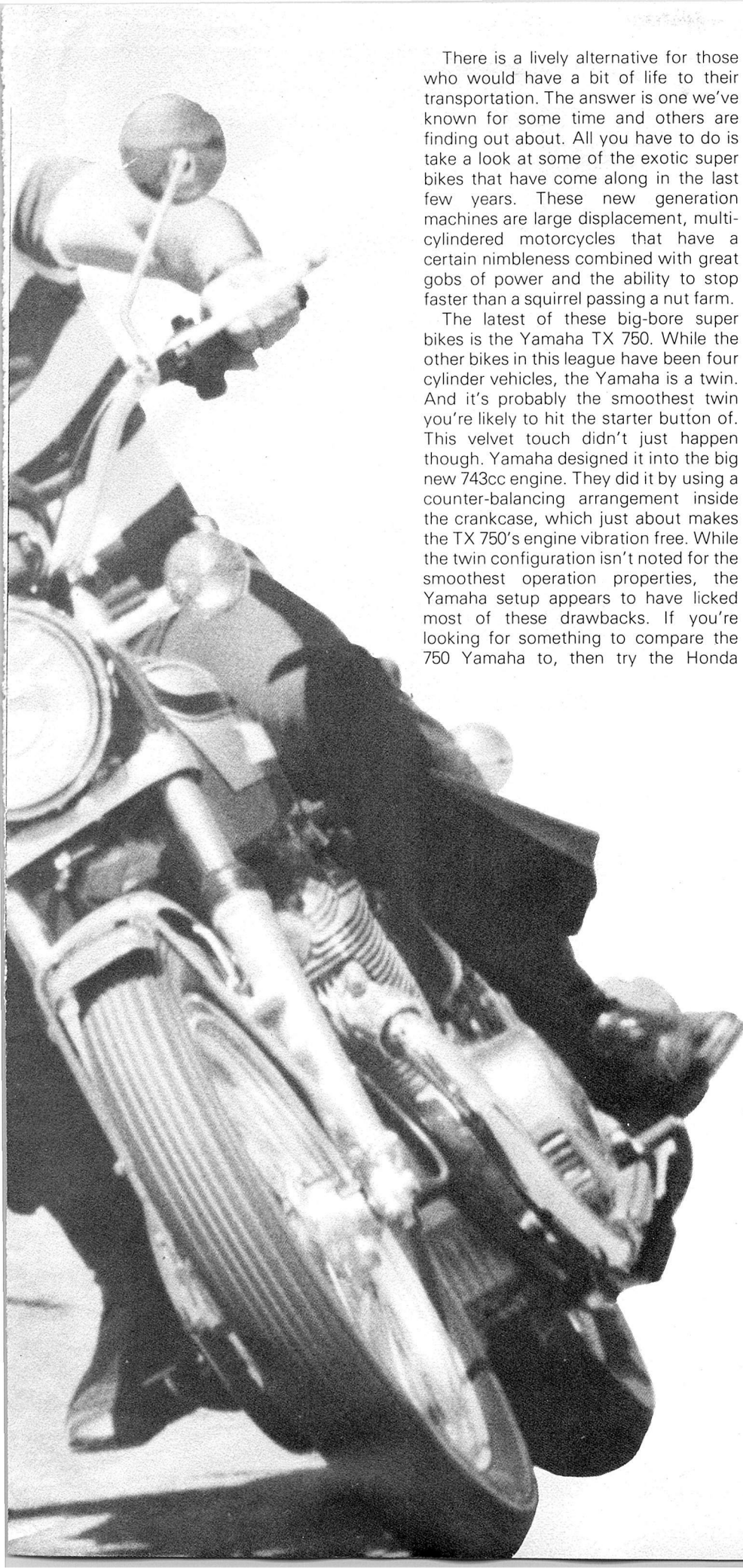
A sturdy chain and lock, fastening the front wheel to the frame, will help discourage sticky-fingered villains who might covet your machine.

When you park, many states require that the rear wheel be against the curb. Never park between parked cars, unless you're prepared to have your bike used as a backstop.

A BRAND NEW
SUPER-SMOOTH
TWIN CYLINDER
HIGHWAY
FLIER
FROM
YAMAHA.

THE TX 750 YAMAHA





There is a lively alternative for those who would have a bit of life to their transportation. The answer is one we've known for some time and others are finding out about. All you have to do is take a look at some of the exotic super bikes that have come along in the last few years. These new generation machines are large displacement, multi-cylindere motorcycles that have a certain nimbleness combined with great gobs of power and the ability to stop faster than a squirrel passing a nut farm.

The latest of these big-bore super bikes is the Yamaha TX 750. While the other bikes in this league have been four cylinder vehicles, the Yamaha is a twin. And it's probably the smoothest twin you're likely to hit the starter button of. This velvet touch didn't just happen though. Yamaha designed it into the big new 743cc engine. They did it by using a counter-balancing arrangement inside the crankcase, which just about makes the TX 750's engine vibration free. While the twin configuration isn't noted for the smoothest operation properties, the Yamaha setup appears to have licked most of these drawbacks. If you're looking for something to compare the 750 Yamaha to, then try the Honda

Four. That's got to say something about it. Something good.

The counterweights of the TX engine are located in the engine's bottom end and are driven via a chain off the crankshaft. Mounted eccentrically, they rotate in the opposite direction of the crankshaft. From engine speeds of 1000 rpm, which is a mere idling speed, you feel virtually nothing but the mild sensation of surging power.

With the TX 750 you get a motorcycle that is new from the ground on up. There is no carry-over from other models in the Yamaha line. So don't think that the engine is derived from Yamaha's XS-2 650 Twin, which apparently is on the way out. Sitting between the new 750 and the 500, it doesn't really seem to have anywhere to go.

The Yamaha 750 lives and breathes in the 3000 to 7000 rpm range, an area that really lets you know where the power is. However, it's so effortless that you can be cruising well above the majority of any posted speed limits, with the exception of Nevada's. Yamaha rates the TX at 63 horsepower, which seems like a proper figure, possibly even a bit conservative. With all that potential zap on tap, it's easy to see that the 750's really at home as a highway flier. It's been bred to devour mile after mile of pavement with minimal fatigue on the rider.

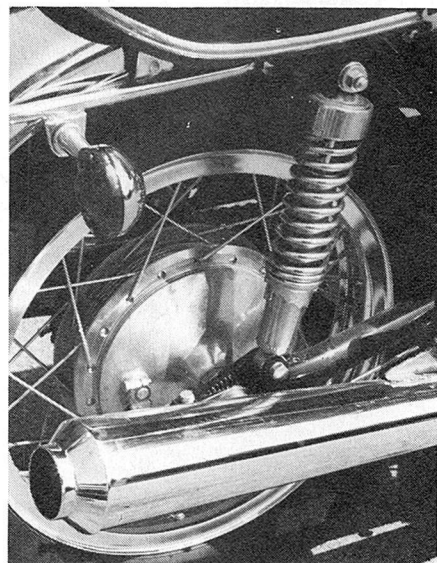
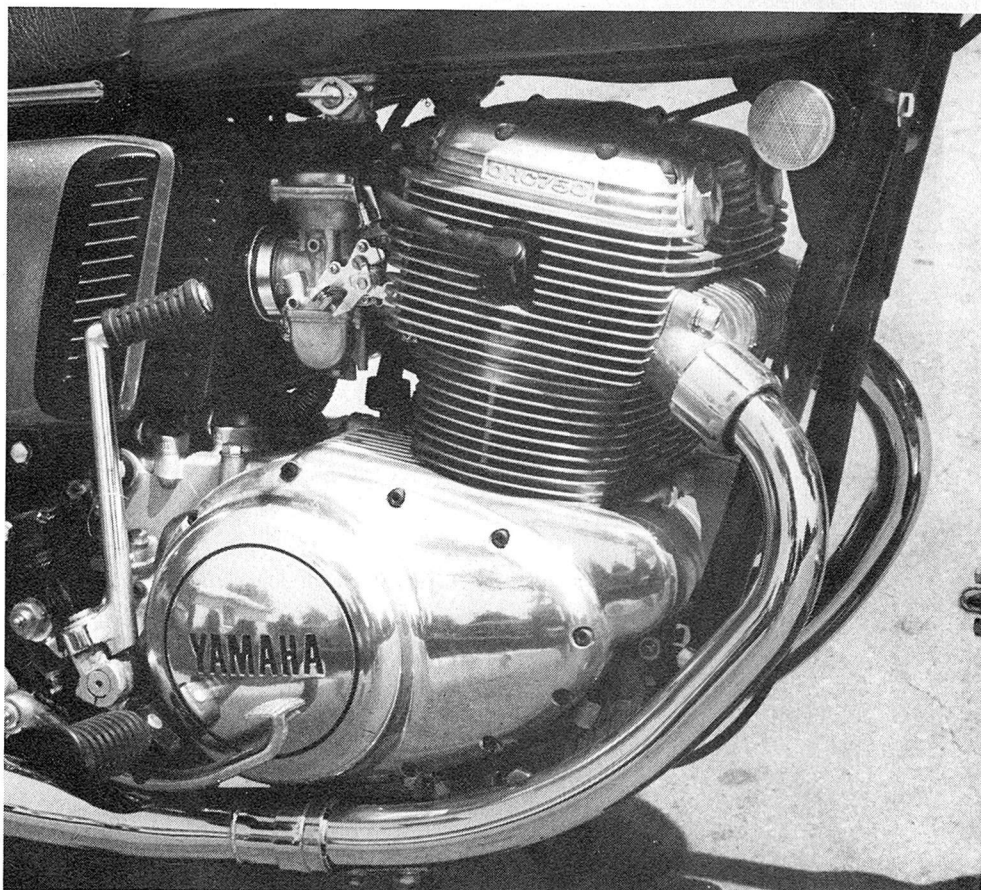
Where it does suffer is in the handling department. It's not quite the same machine once you leave the super roads and head for the back-country two-lane stuff. There are several reasons for this—some we can put our finger on and others we're not so sure of. Weighing in at 521 lb., the bike is not what you'd call a lightweight. Consequently, taking all this bulk through a corner isn't going to be the most delicate demonstration of agility. The front end feels heavy, a good portion of steering trail, perhaps. It gives you the sensation of sluggish unresponsiveness, which detracts from an otherwise responsive bike.

Almost in an effort to make up for the less than outstanding handling, the braking ability of the TX 750 is indeed very good. The reason for this is that its stopping is equal to its going. A more than generous disc hauls it down from the front, while a drum takes care of the rear. An interesting feature on the 750 Yamaha is a light on the instrument-headlight cluster, which tells you when the rear brake needs relining.

Rider comfort is another of the areas in which the 750 gets good marks. Being very comfortable, you are given the impression, (correctly so we might add), that everything is working in harmony. The bike isn't straining and neither are you. Nor is the noise level offensive or even bordering on the bad side of the

With its Omni-phase balancing system, the 750 engine is easily one of the smoothest twins to come along.

Clean styling and crisp detailing make the Yamaha TX750 pleasant from more than one angle.



Rear suspension units were adequate.
Large rear brake was impressive.



Hydraulic front disc brakes do an excellent job of bringing the bike to a stop.



current crop of sound meters now being utilized by various police departments. Not even when you give a quick crack of the extremely responsive throttle. However, when you do you'll know what you have. For it's a healthy, throaty sound.

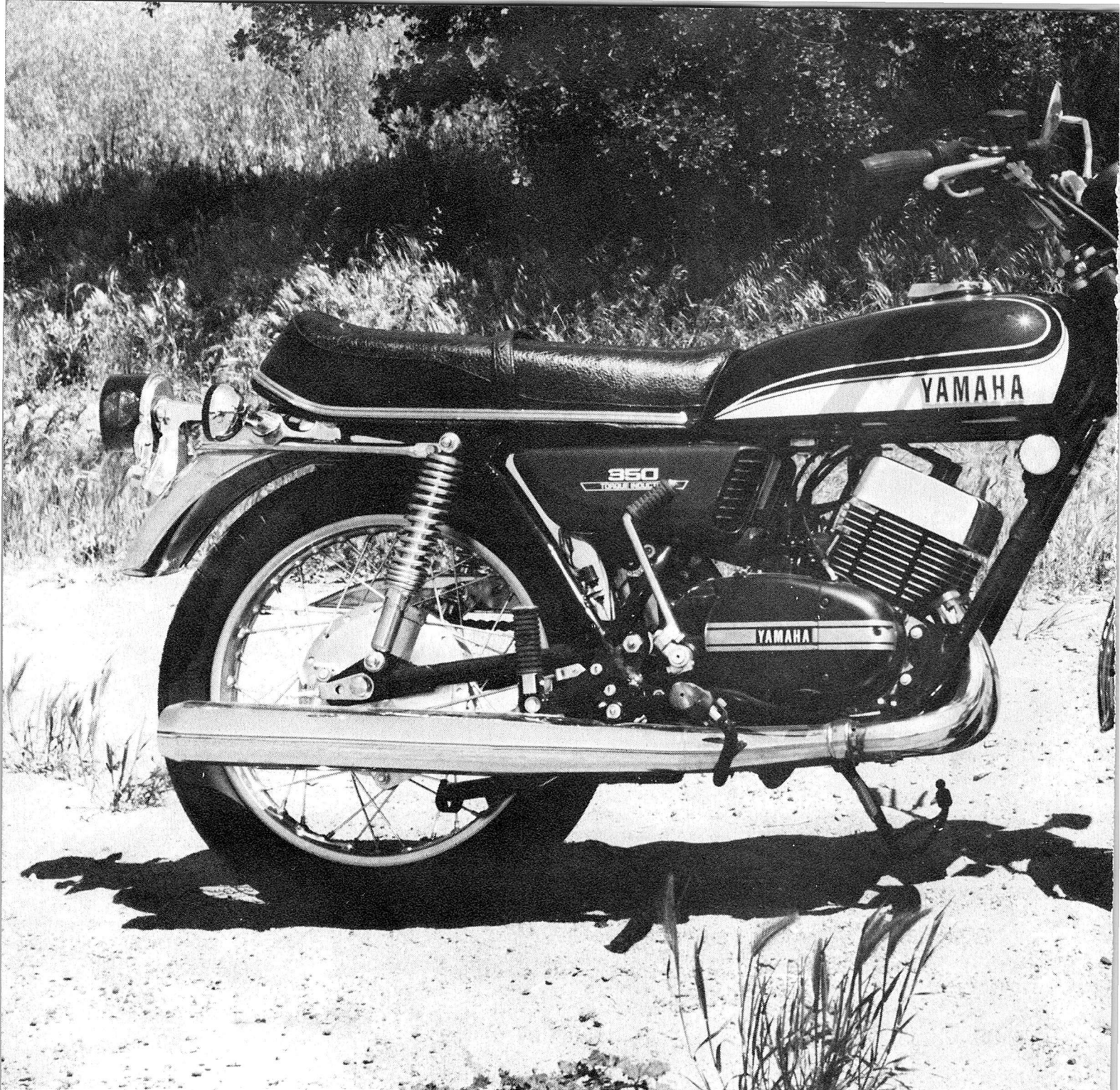
Suspension is fairly well tuned for the type of riding the Yamaha TX is intended for. It does its job well, which is taking the jolts out of the road and keeping the machine stable, without resorting to extremes of hardness or softness. The rear shocks are adjustable and it might be a good idea to do just that. Set them to their hardest setting and you'll get a better ride. The rear shocks of these bikes usually tend toward the soft side anyways, so the additional stiffening makes them just about perfect.

The TX 750 Yamaha does many things well. It's engine is about the smoothest twin you're likely to find. Hit the starter button, let it warm up for a minute and it's ready to roll. Quality is there. Exterior finish and good attention to detailing make the 750 a standout. For anyone contemplating the purchase of a new high speed touring motorcycle, the TX 750 from Yamaha should get some attention before you make any decision.



New to the Yamaha line this year, the TX750 has the full sized feel of a road bike.

An interesting array of lights awaits the rider in the aircraft-like instrument panel, which even includes a light to tell when the brake linings are worn.



**IT'S A
HARD
MACHINE
TO
BEAT
FOR A
BRISK
TURN
THROUGH
THE
COUNTRY.**

For the pure essence of motorcycling pleasure, the combination of a twisting mountain road and good handling motorcycle is hard to beat. It takes a rare combination of suspension, handling, and engine response to really do the job on a winding road. Few production motorcycles this side of the road race track can match the performance of the Yamaha RD350 in this kind of riding.

The RD350 comes by its performance naturally, being the production version of

350cc Yamaha road racer, which was the smallest displacement machine ever to win the tough Daytona 200-mile AMA National. Heading the list of features that make this machine an exceptional performer is the potent two-stroke engine.

Yamaha's 350cc two-stroke street engine is a parallel twin with an "over-square" 64mm bore and 54mm stroke. One of the factors that makes the 350 such a pleasure is its throttle response. This response is, at least in part, the result of the



TESTING THE YAMAHA RD350

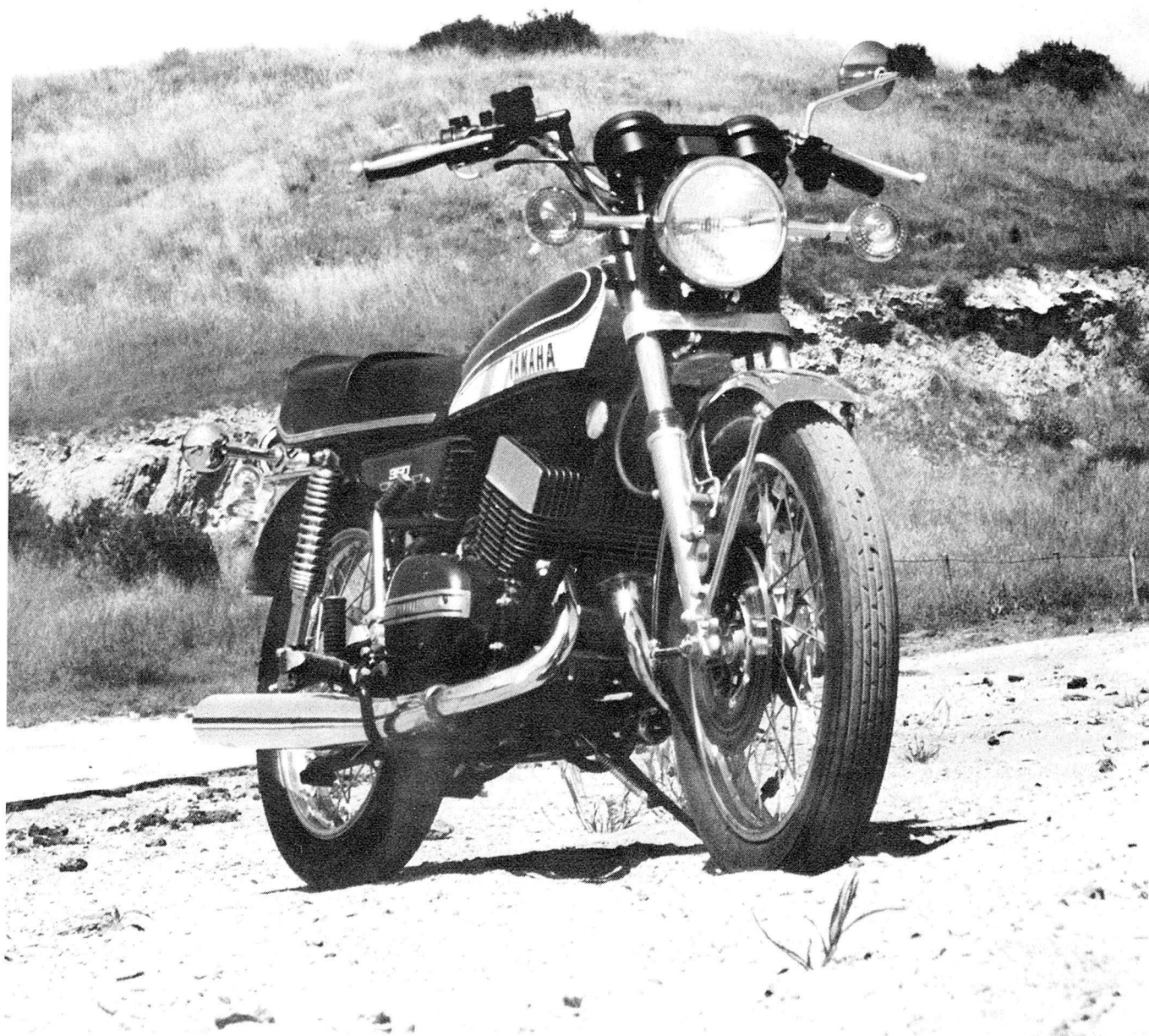
Yamaha's induction system.

The gasoline mixture is introduced into the engine through a pair of 28mm Mikuni carburetors. A recent addition to the Yamaha engine is a road valve setup that Yamaha calls "Torque Induction." This reed valve system provides better low speed response and power, without drastically affecting top-end power.

Unlike the current trend in street machines, the RD350 is not equipped with an electric starter. But starting is not a difficult chore. Only a

moderate amount of pressure is required on the kick start lever to turn the engine over. The primary mounted kick start mechanism allows the engine to be started in gear with the clutch in.

Just having the power available doesn't do you very much good if you can't get it to the ground where you need it. For the RD350, the job of transmitting the power to the rear wheel is handled by a slick six-speed constant mesh transmission. The six ratios are well spaced for the engine and



Not a full-grown road bike, the RD350 comes into its own when the pavement starts to get curvy.

the style of riding that the bike is designed for. There always seems to be just the right gear when you need it.

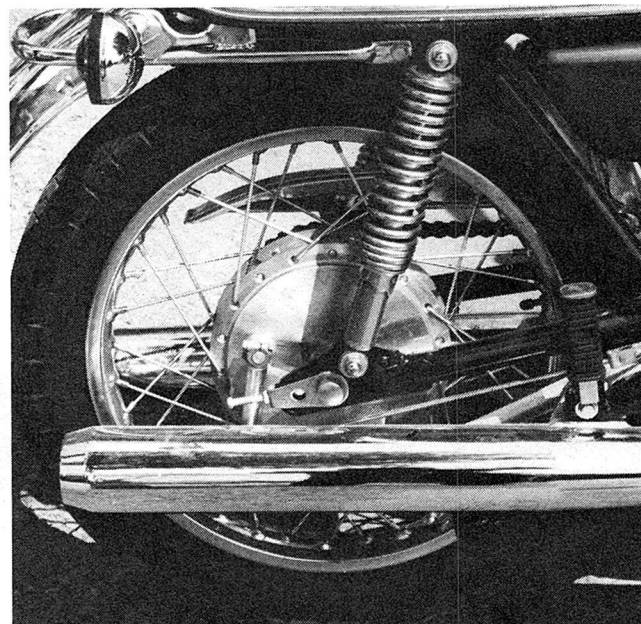
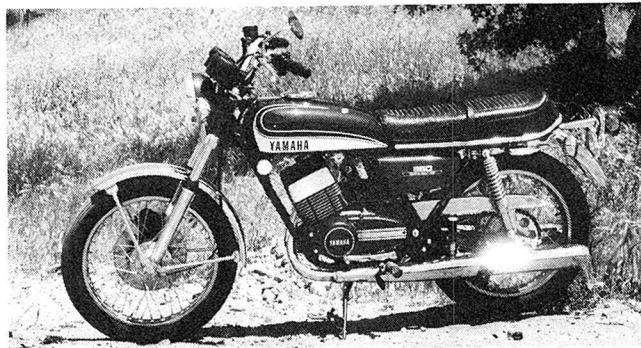
The chassis in the RD350 provides a solid base for responsive handling. The frame is constructed primarily of medium diameter tubing. With the gas tank and other parts fitted, the 350 frame appears pretty much like a run-of-the-mill double cradle

design. A closer look, however, reveals some sophisticated tube bending.

We have come to expect most frames to have a single, large diameter backbone tube, but the Yamaha is different. The upper section of the frame is formed of three medium diameter tubes. From the top of the steering head, one tube runs to the rear and down, to join with the rear down-tube and rear sub-frame section. On



Like the 750, the RD350's disc brake is super. It can bring the 350 to a halt in seconds.



The large rear brake is responsive, but not over-sensitive and pulls the machine down to a standstill in short order.

The RD350 engine is an extremely responsive two-stroke twin. The reed valve setup this year improves low end torque.

the lower end of the steering head, two additional tubes are connected at the same points as the front down-tubes. These two tubes run back just inside the lower edge of the gasoline tank, joining around the seat area with the sub-frame section. All too often the importance of frame design is forgotten when discussing street bike performance, but it is a factor and an important one.

The front suspension is a standard telescopic fork unit. Front fork travel is about four and a half inches. Both damping and spring tension seems just about right, which is to say that it is a little on the firm side. The rear suspension is also standard: swing arm with adjustable coil/shock units. The suspension may be standard, but it does get the job done and done well.

Although the RD350 is

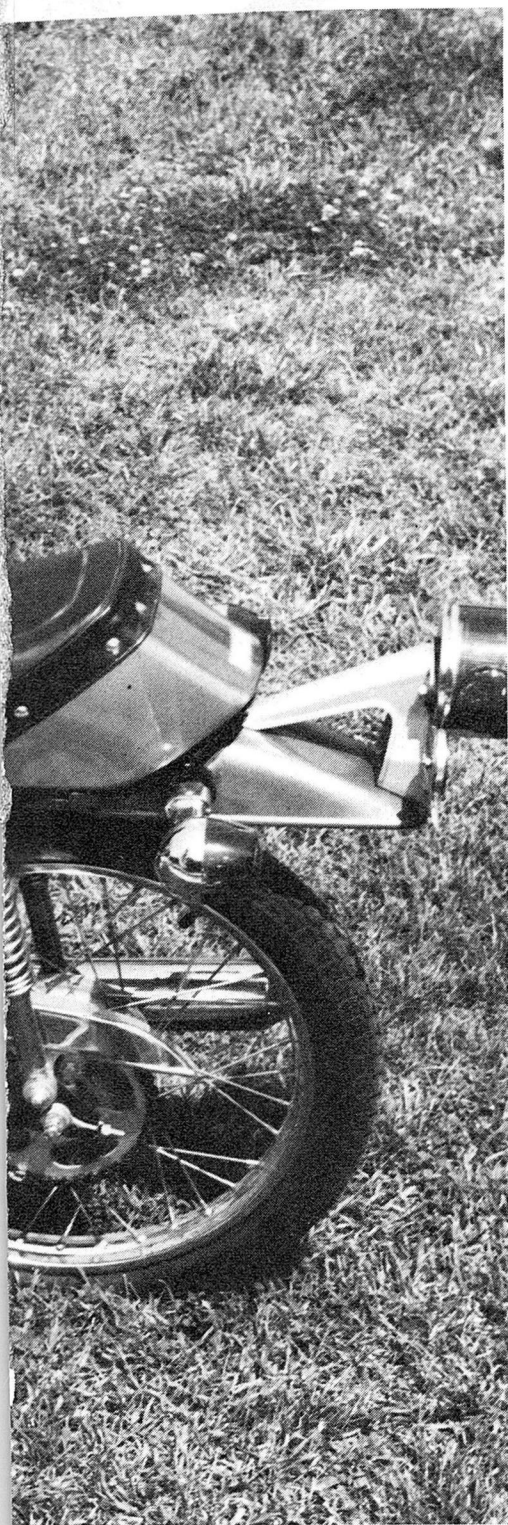
relatively stable at high speeds, it is probably not the best choice for a steady diet of long distance highway travel. Combining swift acceleration, responsive handling, and tremendously effective braking, this machine covers all of the bases. If you want a machine that is agile and easy to handle around town, and a dream for those weekend trips through the country, the 350 is a good selection.





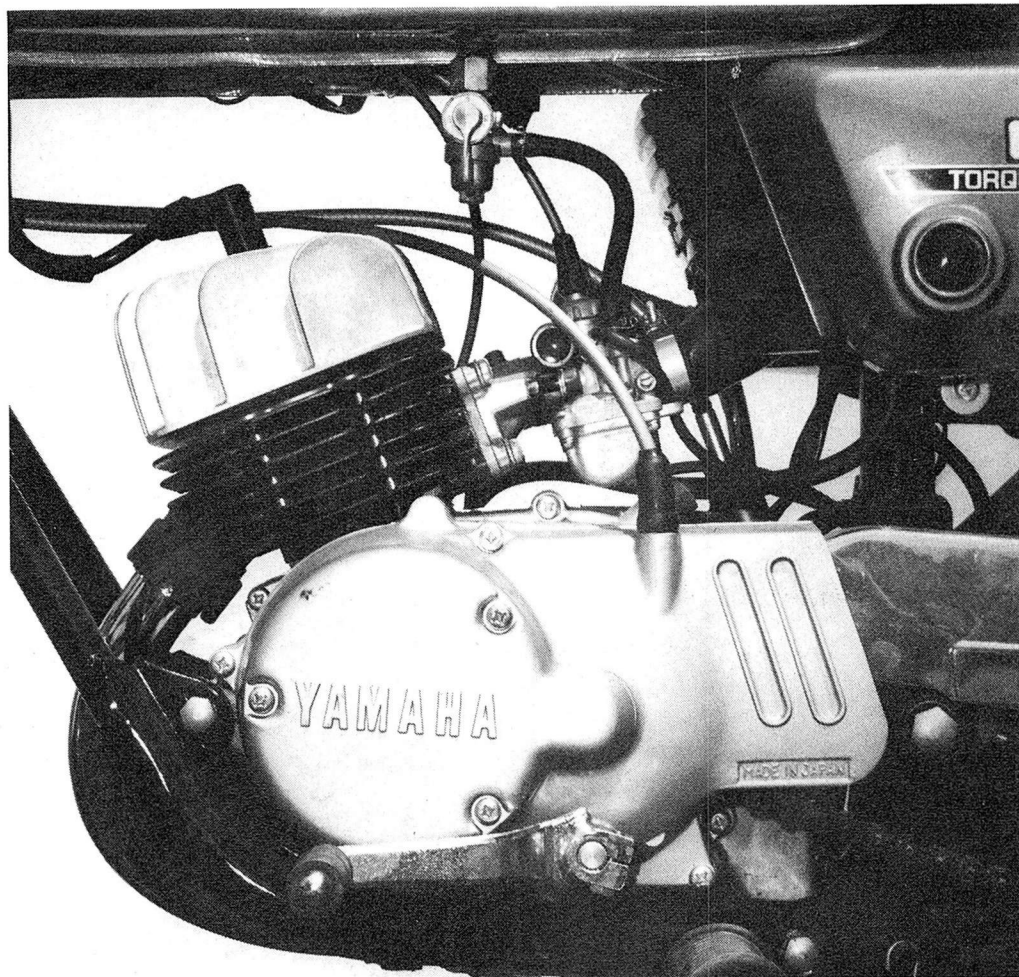
NOT A LOT OF FRILLS AND FANCY STUFF,
JUST A NICE, SIMPLE, EASY-TO-RIDE MACHINE
THAT'S FUN TO BE WITH.

THE YAMAHA RD60



Judged in terms of its larger, more expensive stable mates, the little RD60 doesn't come off as a very impressive motorcycle. It hasn't got flashing acceleration, or crisp handling at high speeds. In fact, it hasn't got high speeds. The RD60, however, was not intended to be judged in terms of these larger machines. It has its own corner of the motorcycle sport. On its own ground, it does the job it was designed to do and does it with a minimum of fuss and frills.

Put in simple terms, the RD60 was



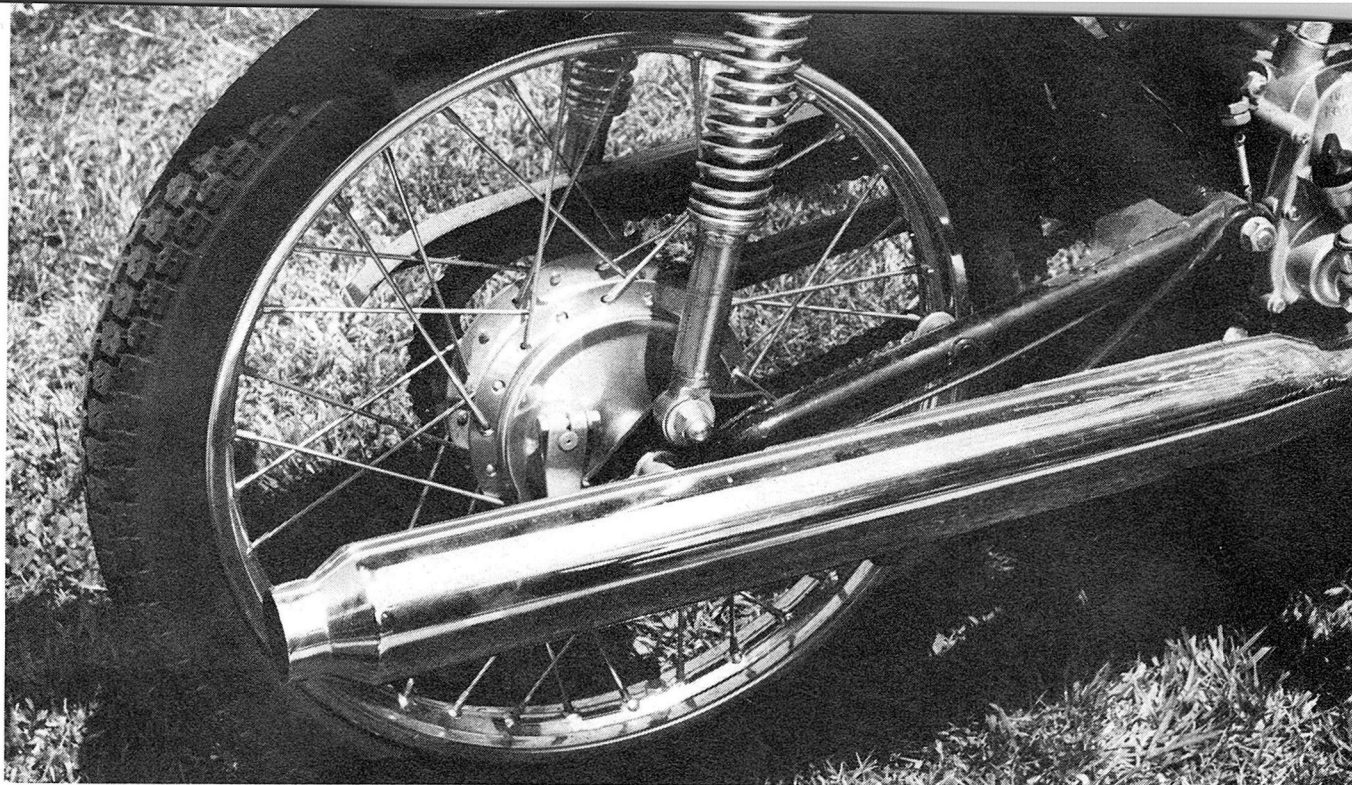
The little 60cc engine is strong, responsive, and easy to start.

designed to provide simple, economical transportation with a measure of fun added. You won't have to brace yourself when you turn the throttle up. Then again you won't have to step off to tell that it's moving either. It is the kind of bike that a new rider can ride with a certain amount of confidence. Yet, it is still a motorcycle and that means that there is fun there as well.

Unlike many small machines, which are easy to ride but provide little in the way of experience toward moving

up to the larger machines, the RD60 offers standard motorcycle controls. This includes a standard multi-plate clutch operated by the lever mounted on the left side of the handlebars. The clutch lever operates with a minimum amount of pressure and is smooth for easier starts by the inexperienced rider.

The transmission is a smooth shifting five-speed unit with a shift pattern like its big brothers. Neutral between low and second, down for low, up for the remainder of the gears.



The rear brakes, like the front, get the job done without much fuss. The exhaust note is very low.

Although the appearance is rather nice, the seat is entirely too narrow and a bit too hard.



A novice rider can get the hang of this setup in short order. Once it's learned it becomes a much easier step if you decide to move on to something larger.

The RD60 is not only patterned after its big brothers in general configuration, but also in the styling and quality of the bigger machines as well. The styling (as the accompanying photos illustrate) is very attractive and the quality (not always easy to pick up on film) is first rate.

The engine in the RD60 is a single cylinder two-stroke with nearly all of the features of the larger Yamaha two-strokes. These include the Torque Induction system, which is a reed valve controlled intake setup which provides good low speed power and response for easier riding and better control. The machine also has the reliable Yamaha Autolube system of engine lubrication. Autolube eliminates the

need for pre-mixing the gas and oil. A traditional hassle that has turned many prospective riders away from the two-stroke type of machine.

The Autolube system uses a separate tank for the engine oil. You put straight gas in the fuel tank and straight two-stroke oil in the oil tank. The Autolube system injects the correct amount of lubricant in the fuel mixture after it leaves the carburetor resulting in a cleaner running engine and fewer headaches for the rider.

One feature that many small bikes have which is absent from the RD60 is an electric starter. Although a slight edge in convenience is given up, there are a number of good reasons for not fitting the machine with electric starting equipment. From an engineering standpoint, the electric starter and related equipment add extra weight. Electrical drain by a starter



The tools, battery and Autolube oil injection filler are all located under the narrow seat.

means a larger battery and more elaborate generating equipment, as well as more complicated wiring. The most significant reason for not equipping the RD60 with an electric starter, however, is the simple fact that it doesn't really need one. Very little force is required on the part of the rider to turn the engine over with the kick start lever and the engine lights off so easily that rarely more than a couple of kicks are required in order to get it going.

The RD60 is a simple machine, designed to do a simple task: provide reliable, economical and enjoyable service for the rider who isn't interested in a full sized, large displacement machine, but still wants to enjoy the fun of motorcycling. It does what it is supposed to do and doesn't make much of a fuss about it. Just the ticket for an introduction to the sport.



Both the front brake and front suspension did what is asked of them. Although not flashy, the 60 is sturdy and reliable.

THE STREET RIDER'S MAINTENANCE GUIDE

**REGULAR INSPECTION,
CARE, AND PERIODIC
MAINTENANCE
IS IMPORTANT,
NOT ONLY TO THE
LONG, TROUBLE-FREE
LIFE OF YOUR
MOTORCYCLE, BUT
TO YOUR OWN
SAFETY AS WELL.**

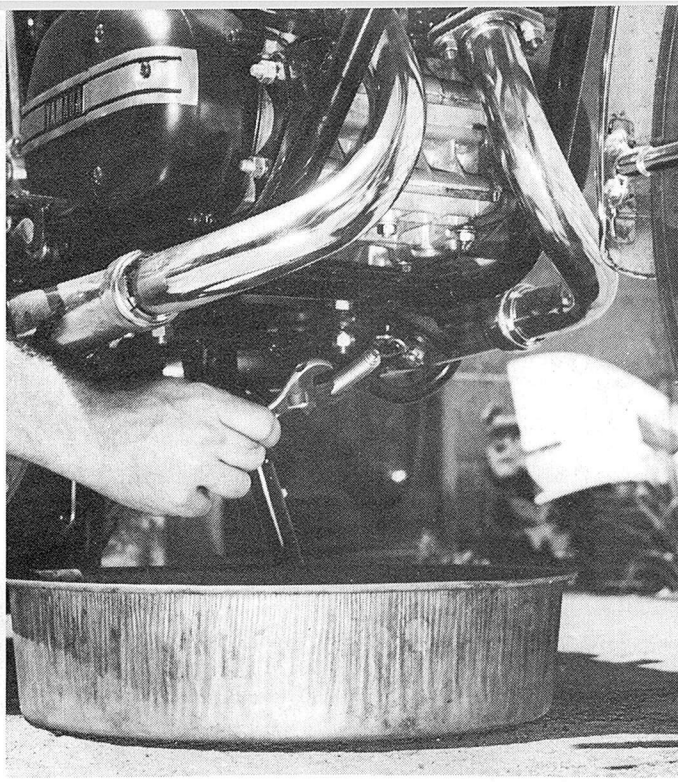
Regular care and maintenance is an important part of motorcycle ownership and an essential factor in both the longevity of the motorcycle and the safety of the individual riding it. The regular maintenance should cover various items at different time intervals. For example, there are a few things that should actually be checked each day before you take the machine out for the first time. This doesn't have to develop into a long, extended process, but should be a simple series of spot checks that become so routine you hardly realize you're doing anything special.

These regular pre-ride spot checks should include such things as a quick check of the gas level. Glance behind, before you motor off, and make sure that the brake light is working. Although it is probably not necessary every day, at least every few days you should also check the level of the oil in the engine, the air pressure in both the front and rear tires, and the general condition of the machine (loose bolts, bare wiring, and similar things). The main idea is to be constantly aware of the condition of the machine and never take it for granted.

In addition to this regular quicky inspection program, a regular maintenance routine should be established. The period of time between regular servicing operations will depend on how much you ride, where you ride, and other similar variables. The manual on most new Yamaha machines recommends a time period of about 2000 miles, but there is no rule against doing it a little more often if you think your situation merits it. There is also no law that says you can't spot check some of the individual items of the regular maintenance list between times to see how things are going.

Outlined on the following pages are the major items that should be checked, lubricated, adjusted, or otherwise serviced at this regular time interval. Some riders prefer to have the servicing done at the local dealer, but it still doesn't hurt to know what to be on the lookout for. Unlike some tune-up or repair operations, there are few tricks to proper motorcycle servicing. The whole thing is largely a matter of common sense and care. If you do the work yourself, make a list of all of the regular items that should be serviced. Add to this list any other special point that may need attention, like the fact that you've noticed a new rattle somewhere or the clutch cable seems to be binding a bit lately. This way, everything gets done and the whole operation is organized and successful.

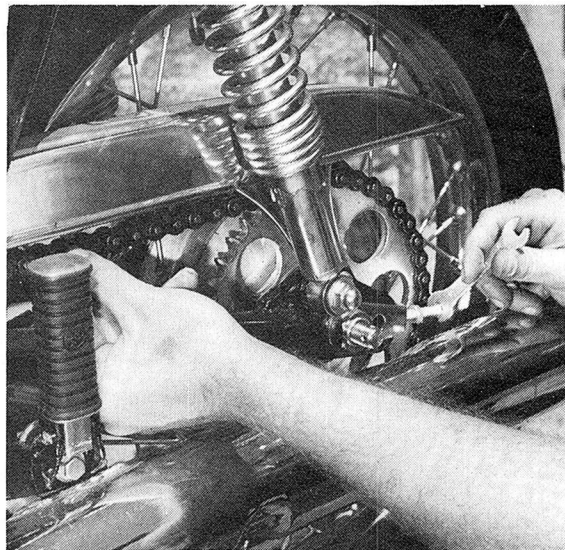
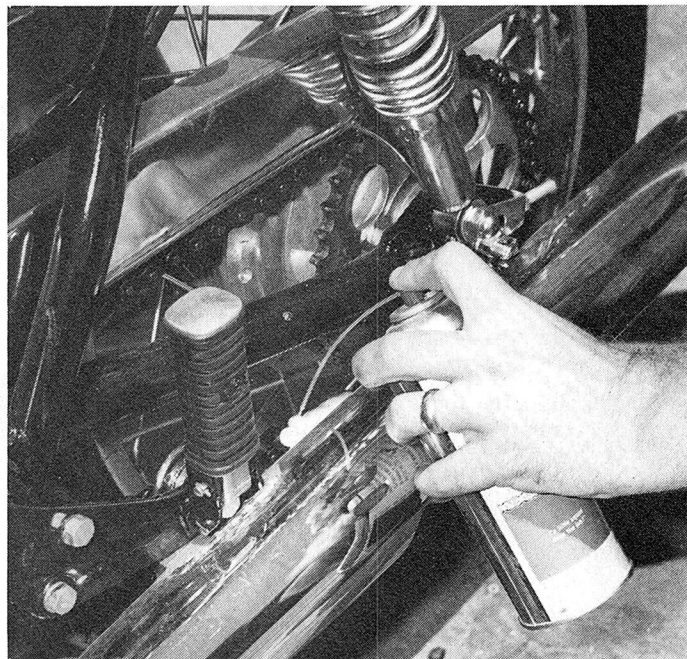




1.

1. Start the job by draining the transmission oil.

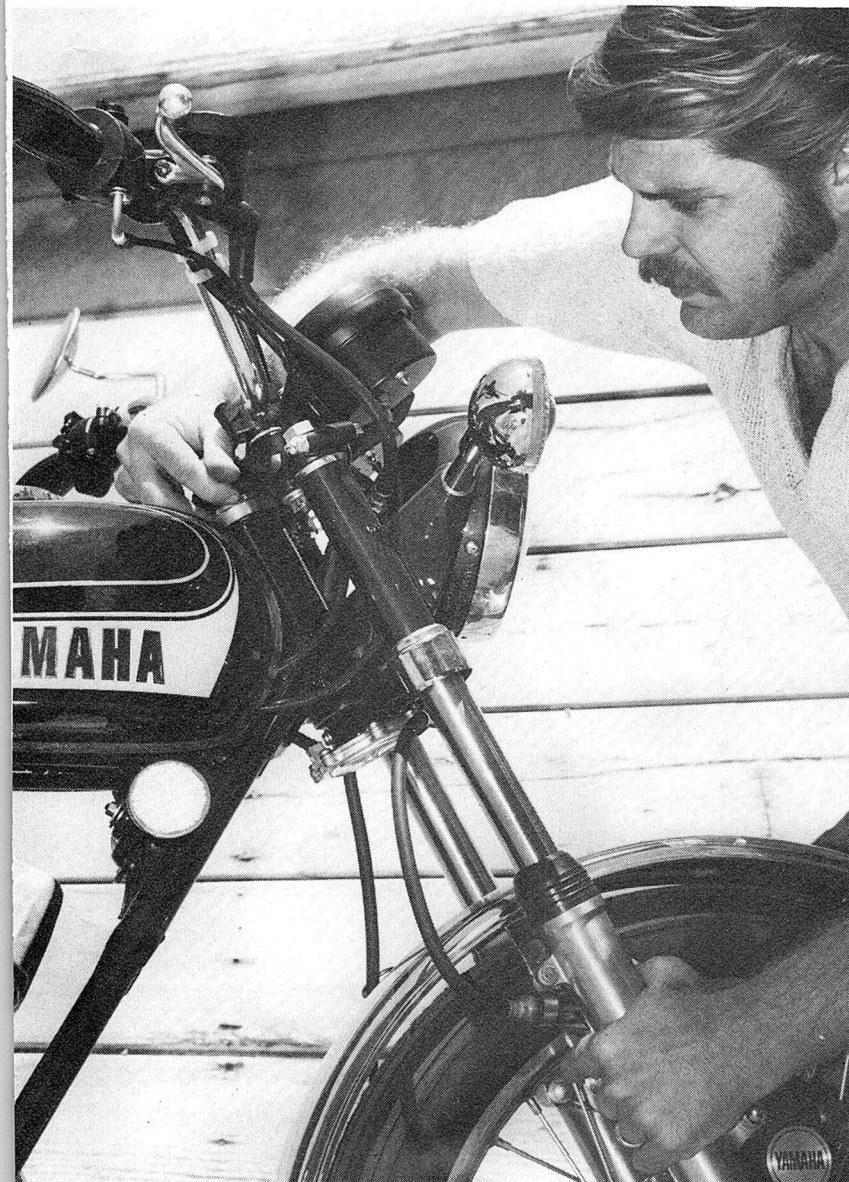
3. Lubricate the entire length of the chain with a non-oily chain lubricant. 3.



4.

4. After you adjust the chain tension, be sure to align the rear axle.

2. To check the steering head bearings, place your finger at the junction between the steering head and the crown and try to move the forks forward and backward.



2.

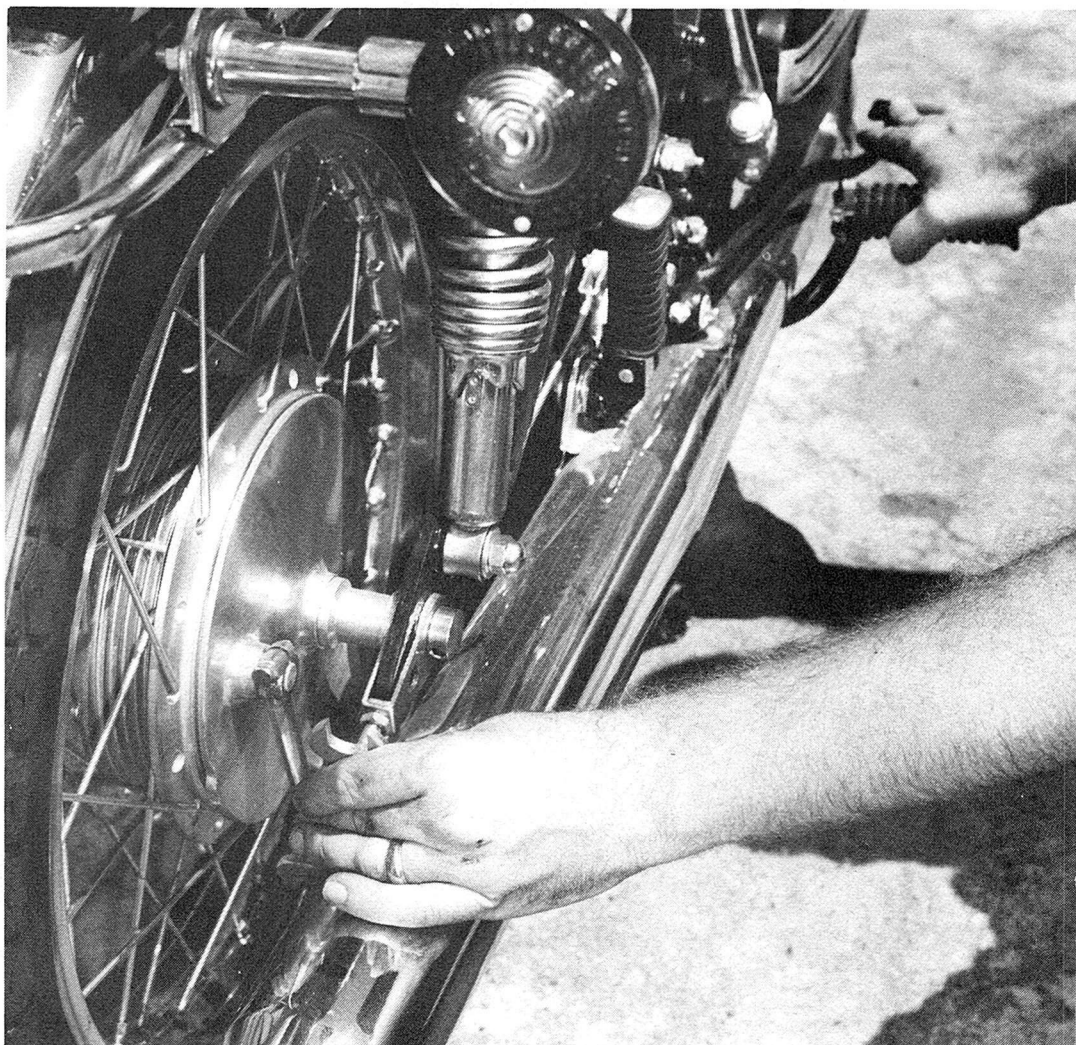
THE STREET RIDER'S MAINTENANCE GUIDE

5.

5. Next, you can adjust the rear brake. Be sure the chain adjustment was done first, as it will affect the brake adjustment.

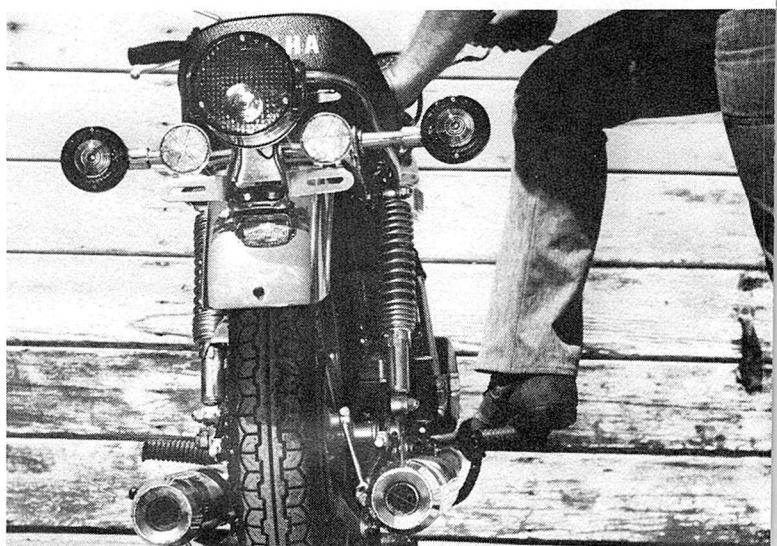
6. After the brake has been adjusted, re-adjust the brake light switch.

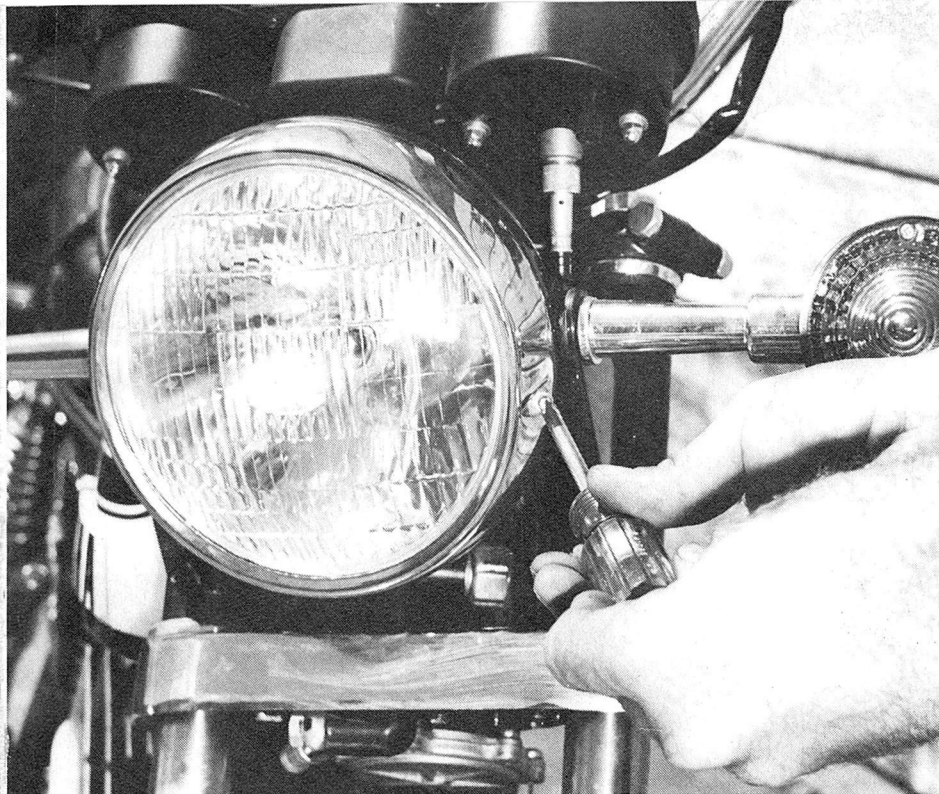
6.



7. Now check to be sure the brake lights are working. While you're at it check all of the lights, including the headlight adjustment.

7.



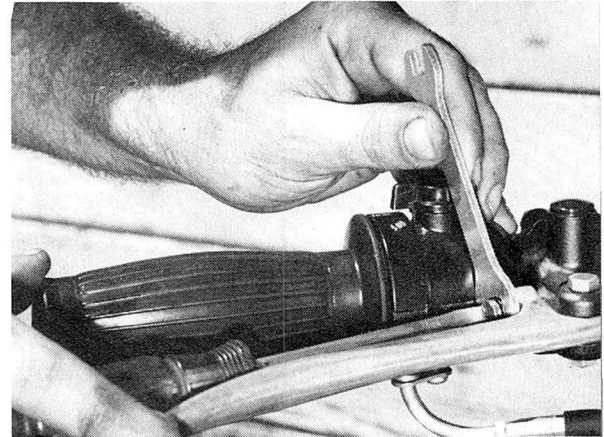


8.

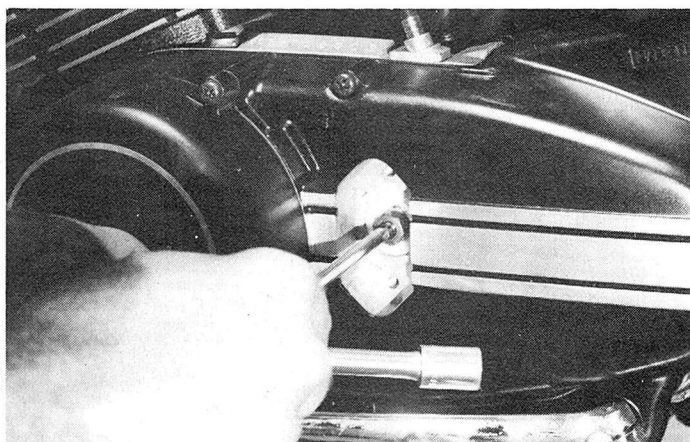
8. The headlight adjusting screw is located on the left side of the headlight flange.

10. The disc brake control is adjusted by backing off the lock nut and turning the adjusting screw, located behind the handle.

10.



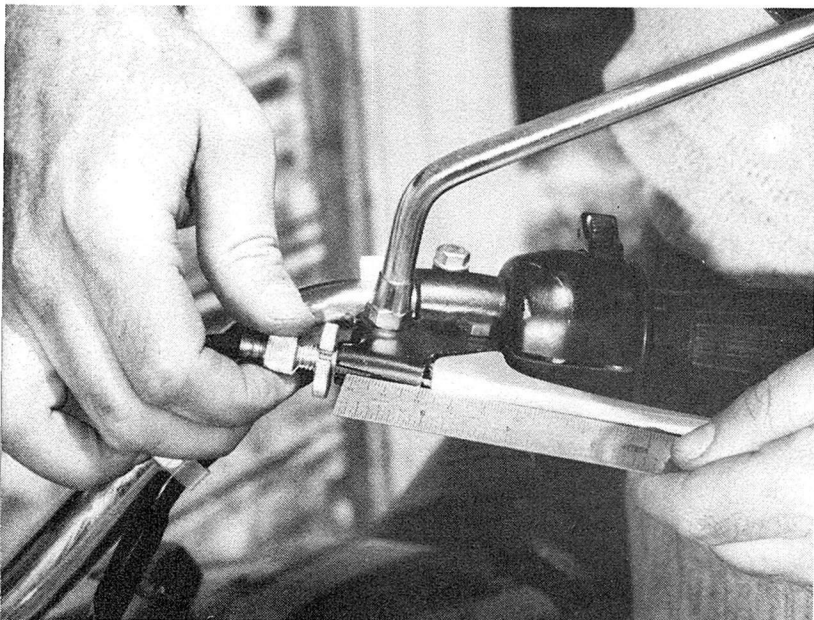
9. If the bike is equipped with disc brakes, check the level in the brake reservoir.



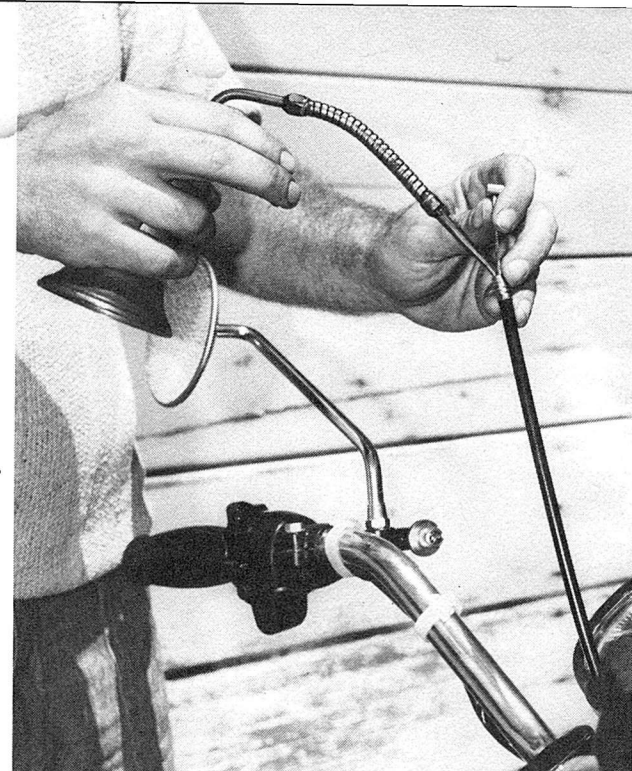
11. The clutch adjustment is on the left side of the engine. Turn the adjusting screw in until it bottoms and back it off 1/2 turn.

11.

THE STREET RIDER'S MAINTENANCE GUIDE



12.



13.

13. Remove the end of the control cables, and put a few drops of oil between the housing and the cable.

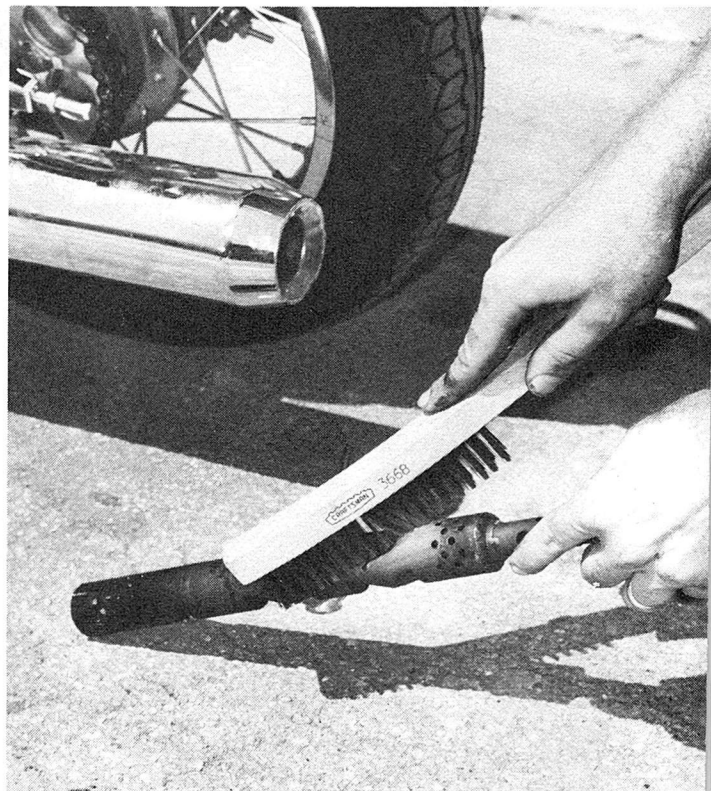
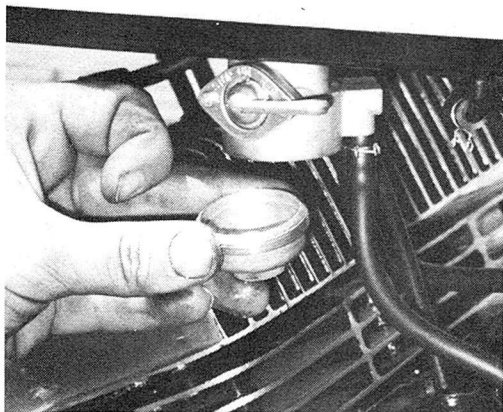
12. Adjust the clutch lever so that there is a gap of 2mm to 3mm between the lever base and the housing.

14. Remove the exhaust baffles and clean the carbon off of them with a wire brush.

14.

15. The fuel sediment bowl can accumulate a lot of crud. Remove it and clean periodically.

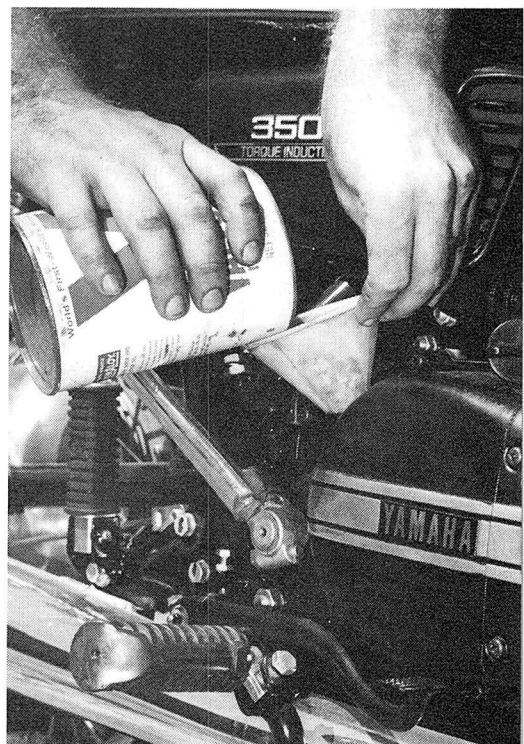
15.



16.

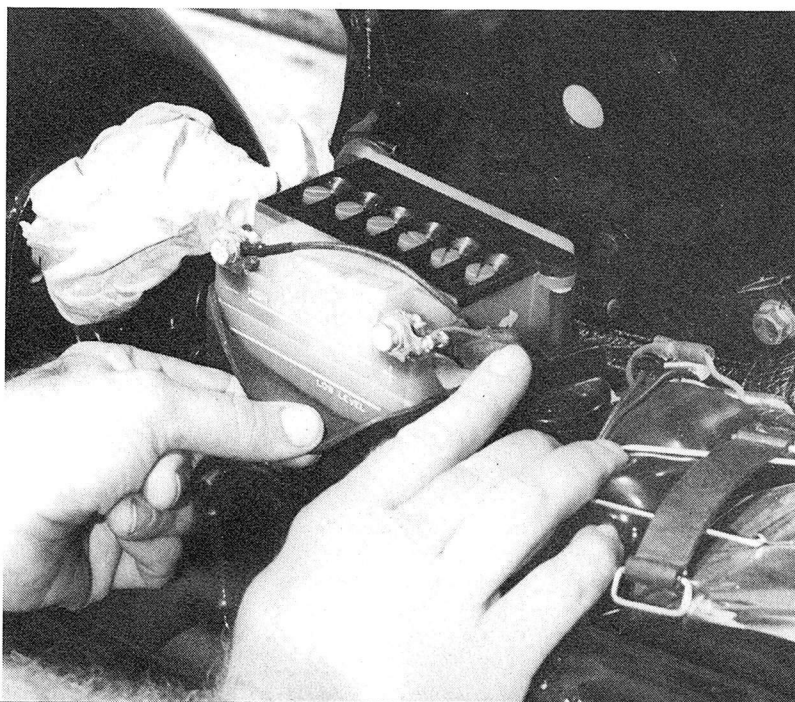
16. If you have a two-stroke, check the level in the Autolube reservoir.

17. Now you can re-fill the transmission with new oil.



18. Check the fluid level in the battery and the condition of the wires and connectors.

18.



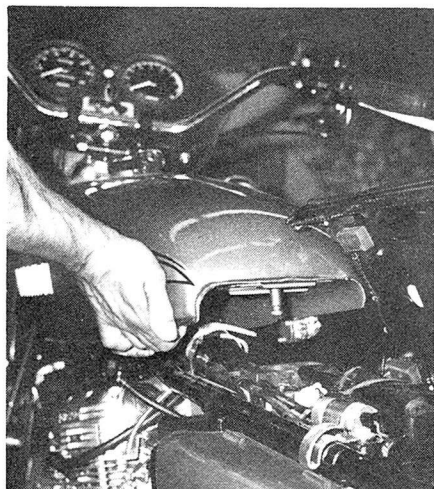
**YAMAHA BUILDS
THREE DIFFERENT
FOUR-STROKE
ENGINES.
HERE IS
A GUIDE FOR
TUNING THEM UP.**

At one time not too many years ago, tuning a motorcycle was no simple task. It could be a hit or miss situation that called for a lot of experience or loads of luck. Today, things are different. With improved engine design and precision components, an engine tuneup is a much simpler task. Most

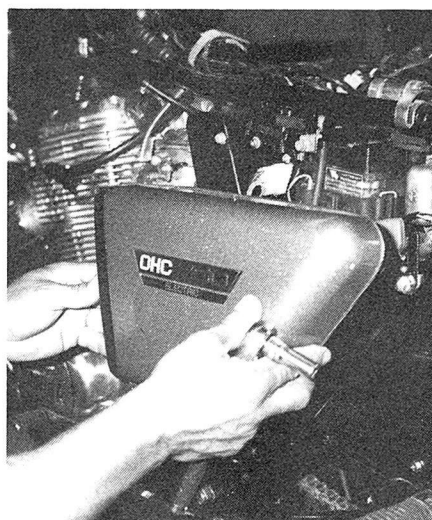
the two carburetors. Loosen the lock on the adjuster and turn the adjuster until the center rod is flush with end, then turn the adjuster ¼ turn out and replace the cover.

VALVE ADJUSTMENT

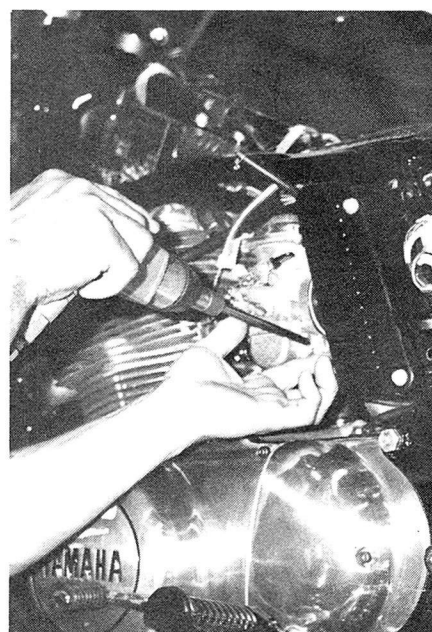
Before you start to adjust the valves, the first step is to



To gain better access to the engine, the first step is to remove the gas tank.



Next, remove the fiberglass side cover from the left side of the motorcycle for access to the air filter element.



Now, remove the carburetor hose clamps and pull the air filter element out from its mounting place.

TUNING THE YAMAHA FOUR STROKES

motorcycle enthusiasts can learn to do their own tuneups, with a bit of practice, patience, and care.

In the following pages we will run through the steps that are necessary for the typical Yamaha four-stroke tuneup. The subject for this series is the Yamaha TX750, but it is typical of the other Yamaha machines. Follow these basic steps and the operation should be a snap.

The first step, for better access to the engine, is to remove the gas tank from the motorcycle. Be sure that the gas petcocks are turned off before removing the fuel lines at the petcock. Next, raise the seat and remove the tank by pulling it toward the rear.

CAM CHAIN ADJUSTMENT

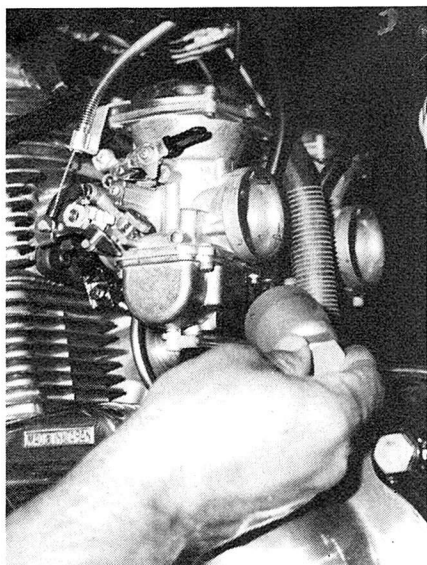
Start here by removing the left fiberglass side cover and the air cleaner box. Next, remove the cam chain adjuster cover, which is located in the middle of the engine just below

remove the spark plugs from both cylinders. Next, remove the engine side cover from the left side. Next remove the two caps on the side of the engine to expose the end of the crankshaft and the timing marks. Finally, remove the caps at the top of the engine that cover the valve adjustment screws.

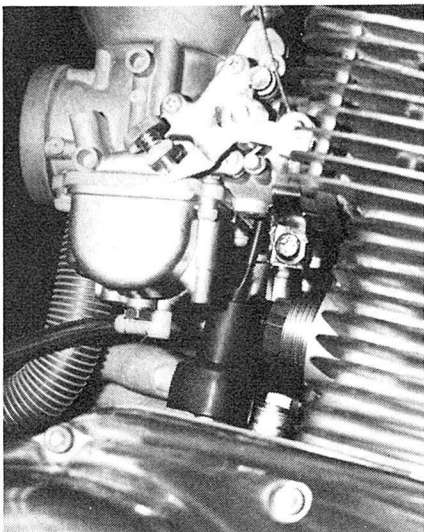
For the cylinder that you are adjusting, locate the top dead center mark where both of the valves are closed. This is the point at which these valves are adjusted. The proper valve gap should be .002-in. Check the gap with a gap gauge and adjust the gap by loosening the lock nut, turning the adjuster, and tightening the lock nut. Check to make sure that the adjustment doesn't change when the lock nut is tightened.

POINT GAP ADJUSTMENT

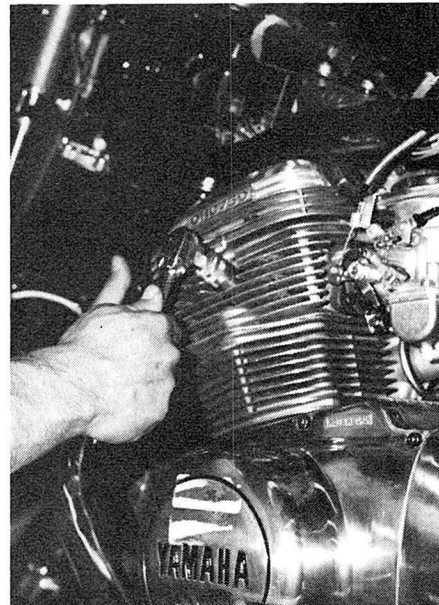
The ignition points are located on the left side of the engine. To check the point gap, turn the engine over until



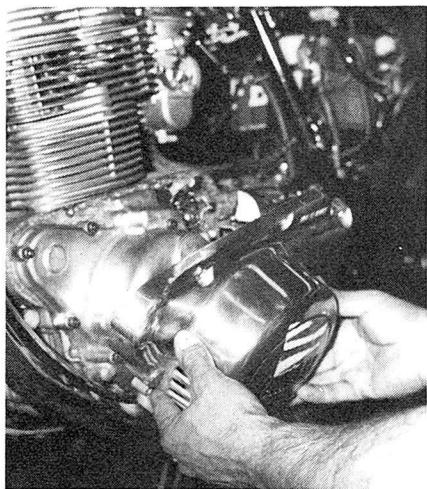
The timing chain adjuster is located behind this cover in the center of the cylinders below the two carburetors.



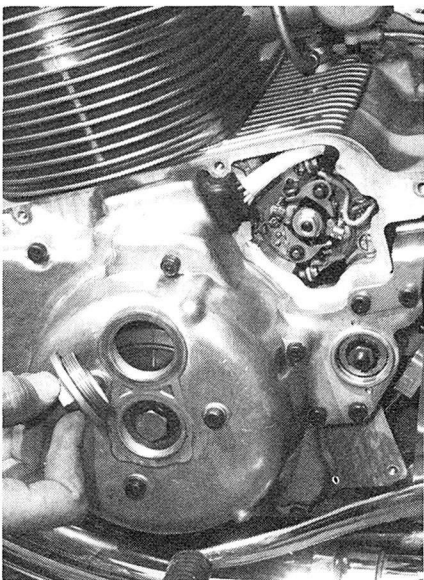
To adjust the cam chain tension, turn the adjuster until the center rod is 1/4 of a turn inside the adjuster.



Before going further, remove both spark plugs. These plugs can be cleaned and re-installed or replaced after the points and timing have been adjusted.



Remove the left engine case side cover to gain access to the timing marks needed for adjusting the valves and ignition.



The two caps, on the side of the engine case, screw out to reveal the timing marks and the end of the crankshaft.



The caps, on the top front and rear of the engine, cover the valve adjustment screws.

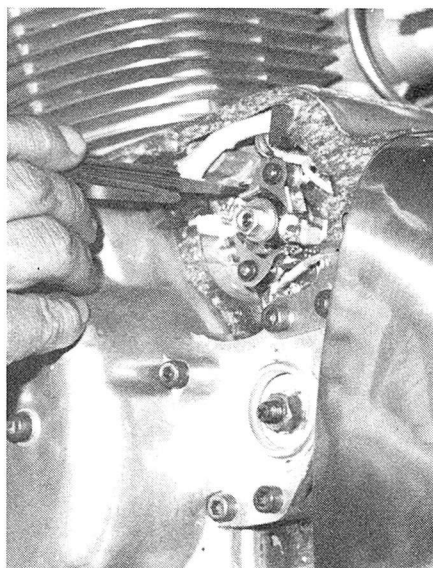
CARBURETOR ADJUSTMENT

Carburetor adjustment can be a tricky operation. Until you understand exactly what you are doing, keep your carburetor adjustments to a minimum. Idle adjustment and carburetor synchronization are fairly easy, however. After the

the rubbing block of the points you are checking is on the highest point of the cam lobe and insert a gap gauge. The gap should be between .012 and .016 inches. Loosen the hold down screws and move the point plate to achieve the desired gap. Recheck the gap after the plate is tightened



The valves should be set at .002 inch as determined by a feeler gauge. Re-check the setting after the lock nuts have been tightened.



The ignition point gap should be set at between .012 and .016 inch, before setting the ignition timing.



Attach a point checker or continuity light and adjust the point plates so that the points open on their respective "F" marks on the flywheel.

TUNING THE YAMAHA FOUR STROKES

down again. Repeat the process for the second set of points.

IGNITION TIMING

To accurately set the ignition timing an ohmmeter, point checker, or continuity light should be used to determine the exact point at which the points open. Turn the engine over counterclockwise, if the timing is correct the points should open just as the "F" timing mark comes across the pointer. Set the right side points first. Timing for the right cylinder is adjusted by moving the entire point backing plate. After the right side is set, the left side is adjusted by moving the small mounting plate.

CLUTCH ADJUSTMENT

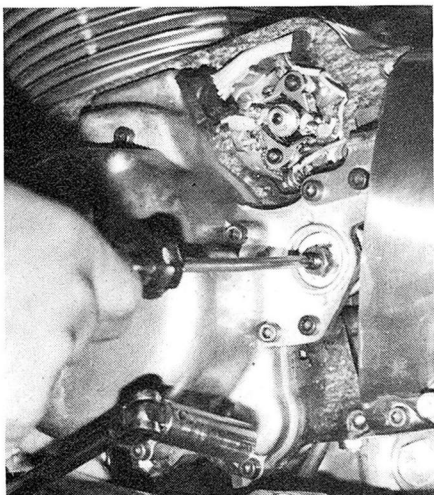
While you have the side cover off, the clutch can be adjusted simply by backing off the lock nut and then turning the adjusting screw in until the adjuster bottoms. Back off the adjuster $\frac{1}{2}$ turn, tighten the lock nut and the adjustment is completed.

rest of the tuneup is completed, it is likely that the idle adjustment will need to be reset. This is done by turning the throttle stop screw. With two carburetors, it is important that both work in unison. Each carburetor has a separate cable from the throttle hand grip. Adjust the two cables so that both carburetors are open fully when the hand grip is open fully.

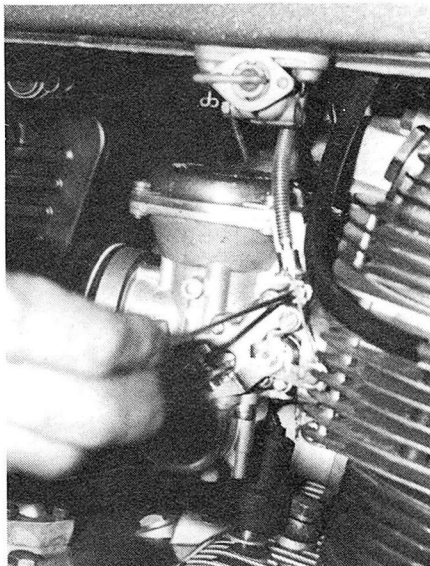
THE FINISHING TOUCHES

Part of your tuneup should include some attention to small details, like being sure that the air cleaner element is clean and not restricting the air flow. On the 750, the filter element can be put back two ways. Be sure that you don't replace it upside down. Also check the fluid level in the battery as well as electrical connections, wiring, fuel lines, and similar items. Done correctly, a good tuneup will provide better fuel economy, better performance, and easier starting. Those are pretty good returns for a small investment in time.

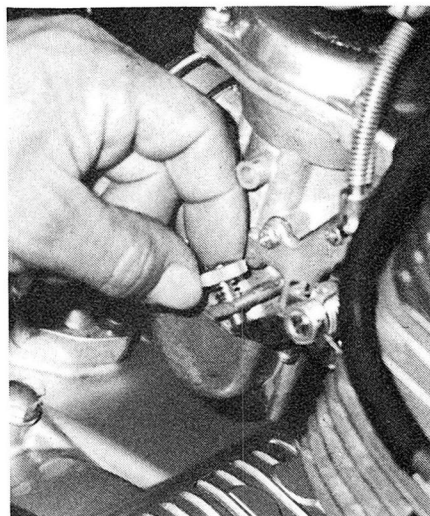




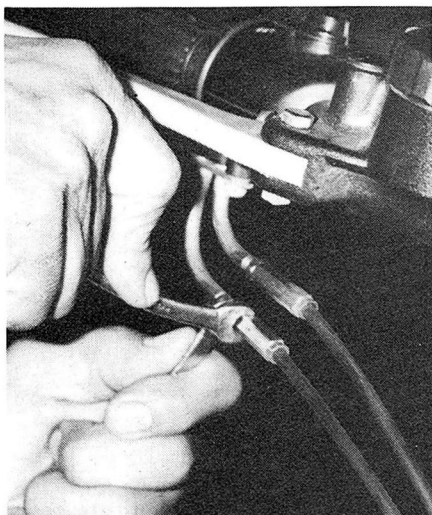
Adjust the clutch by loosening the lock nut, turning the adjusting screw in until it bottoms, and then backing it out 1/2 turn.



One simple carburetor adjustment is the air screw. Turn the screw to achieve the highest smooth idling speed. Then reset throttle stop screw.



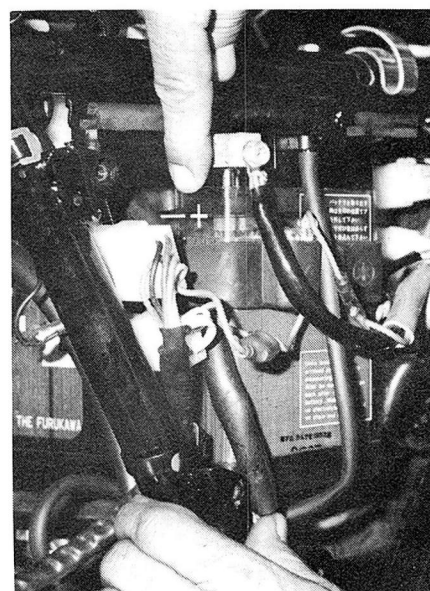
The throttle stop screw is used to control idle speed. Turn the screw in or out to achieve the desired idle speed.



Synchronize the two carburetors by adjusting their respective cables where they enter the hand grip assembly.

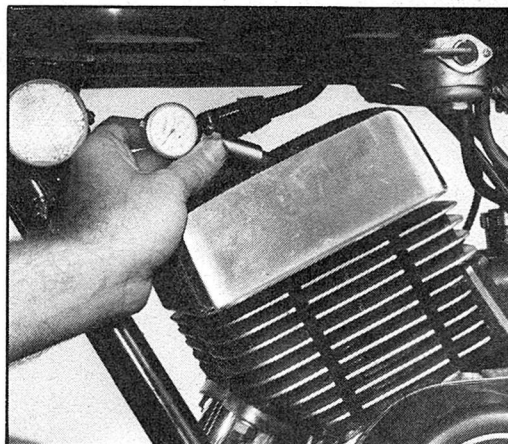


Be sure the air filter element is clean before it is re-installed. A dirty air filter can restrict air flow and reduce performance.

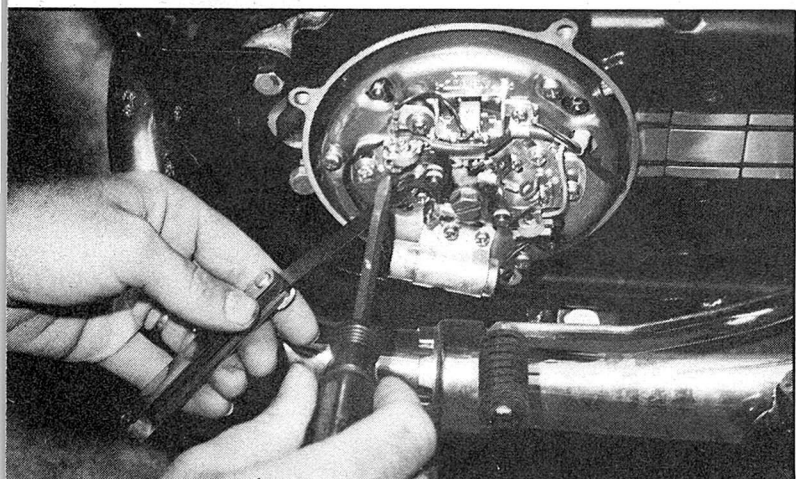


While you have the fiberglass side cover off, check the fluid level in the battery and inspect the wiring and connectors.

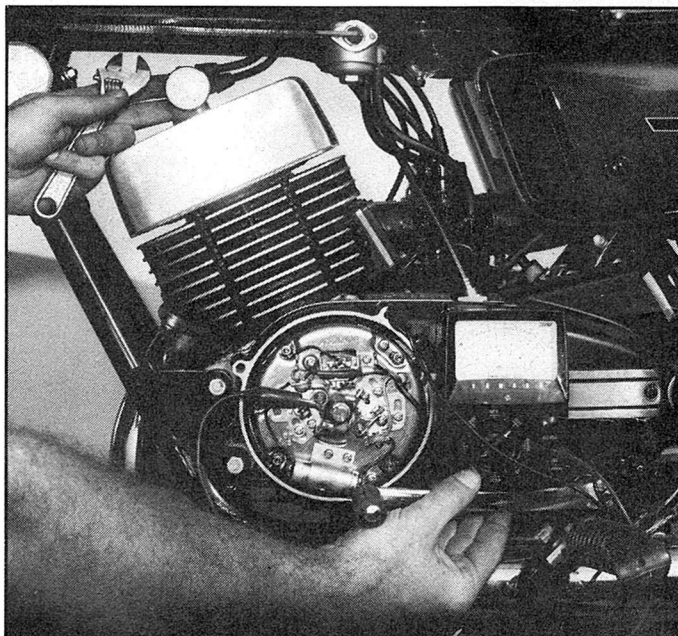
The first step in the tuneup is to remove the spark plug (or plugs), and set it aside until later.



Use a dial indicator in the spark plug hole to accurately determine the proper piston position for correct ignition timing.



On the Yamaha twins the point gap is set separately from the timing. Use a feeler gauge to set the point gap between .012 and .016 inches.



An ohmmeter, attached across the points, is used to determine the exact point opening time.

TUNING THE TWO- STROKES

The tuneup procedures on two-strokes are simple enough for most novices to do, if they go about it in the correct way. There are not many secrets to a successful tuneup, but there are a few tips which might help. The operation should be planned in advance. Try to learn as much about your specific bike as you can before you start. Yamaha has some excellent shop manuals, one for each different model. One of these is a wise investment if you are planning to do any work on your own machine.

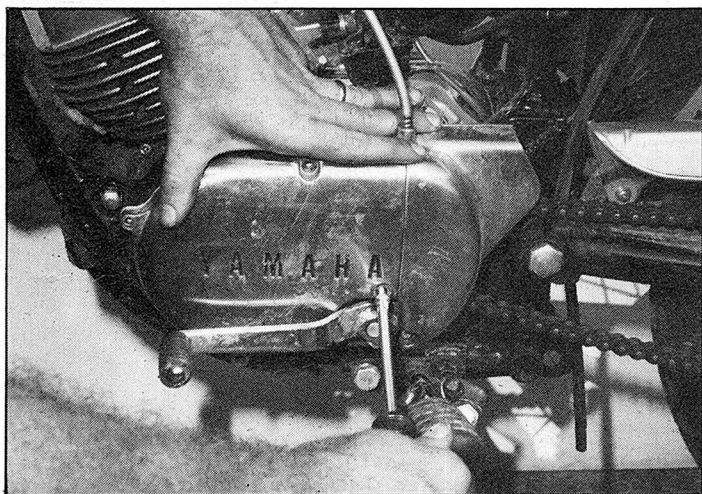
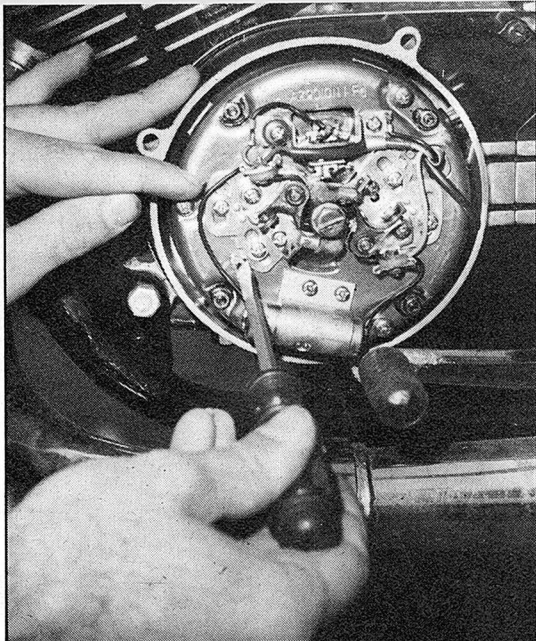
Finally, go out of your way to be clean and neat during the tuneup. It doesn't take much dirt in the wrong

place to cause many problems. Keep clean rags handy and wipe off everything, including your hands, frequently.

The first basic step in the tuneup procedure is to remove the spark plug (or plugs) from the engine and set it aside for later. The first thing that we are going to do in the tuneup is to set the ignition timing. Although the exact steps vary a bit with the different types of ignition systems that are used on the different Yamaha machines, we'll follow the general process.

Before you attempt to set the timing, look at the surface of the

The timing on the twin is adjusted by moving the point mounting plate. Recheck the timing after the plate is tightened down.



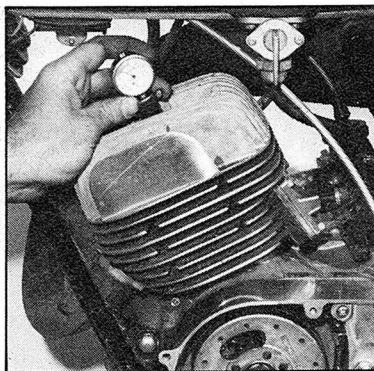
On the singles, remove the left side case cover to get to the magneto where the timing is adjusted.

breaker points to determine if they are worn or pitted. On some of the Yamaha systems the points must be examined by looking through the inspection hole in the flywheel. If the points must be cleaned or replaced, it will require that the flywheel be removed. A special flywheel puller is available from your local Yamaha dealer for a couple of dollars. This tool will make pulling the flywheel a simple job. If the points are to be cleaned, clean them with a point file or emery board. Clean the points carefully when you have finished.

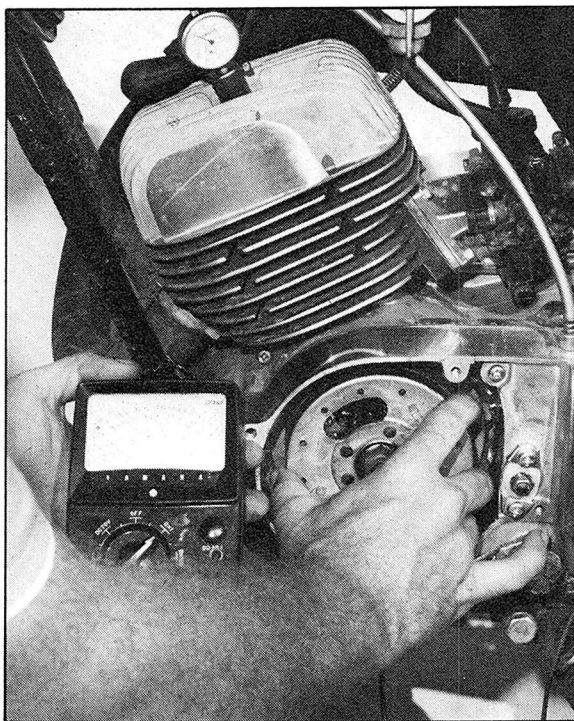
The basic idea in setting the timing is to get the points to open (an event

that causes the spark plug to spark) at a specific point in the travel of the piston up the cylinder. The most accurate method of determining the exact point at which the breaker points open is to use an ohmmeter, point checker, or continuity light, hooked across the point circuit.

The most precise method of determining the exact location of the piston is the use of a dial indicator, which is available from your local Yamaha dealer or accessory shop. Install the indicator in the spark plug hole and set it to zero with the piston at top dead center. From this point, rotate the engine backward until the



Install the dial indicator in the spark plug hole and set the dial at zero with the piston at top dead center.

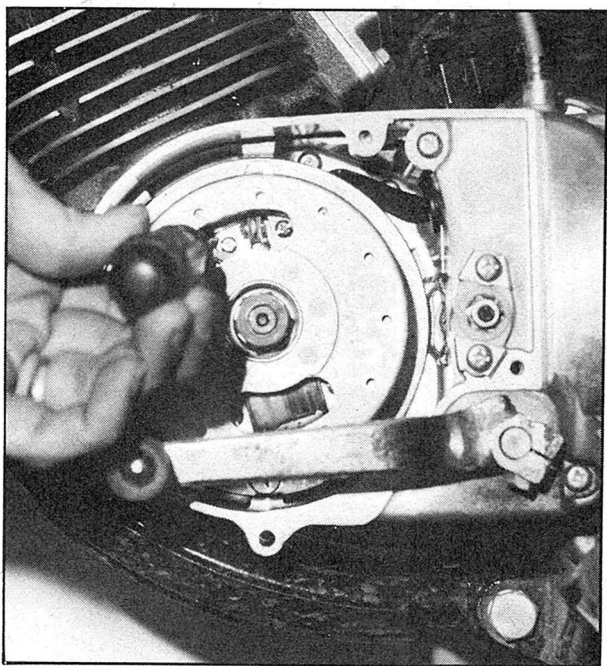


With the ohmmeter installed, rotate the engine backward from top dead center to determine the point at which the points are opening.

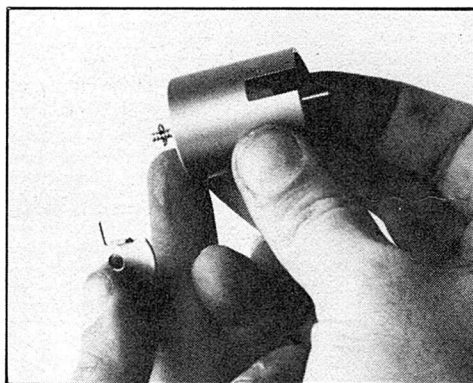
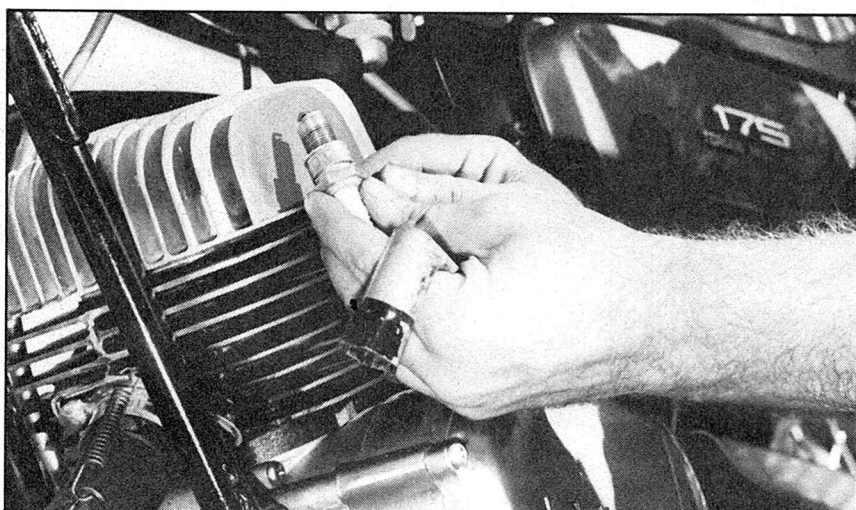
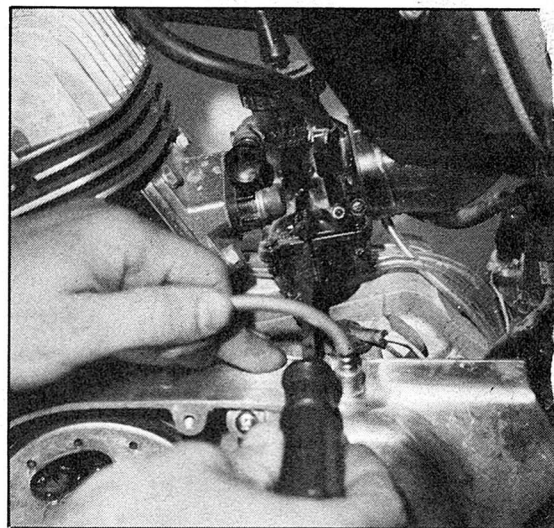
THE PROPER TUNEUP IS IMPORTANT ON A TWO-STROKE ENGINE. HERE'S THE RUNDOWN ON KEEPING THE YAMAHA TWO-STROKES PERFORMING LIKE THEY SHOULD.

The timing is set by positioning the backing plate so that the points just begin to open at the specified time.

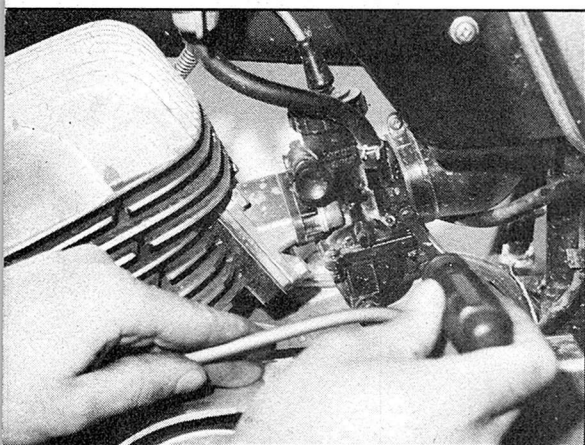
Now, inspect the spark plug to determine if it can be cleaned and re-installed or should be replaced.



Idle speed adjustment is made by turning the throttle stop screw in or out as needed.



Mid-range fuel mixture is determined by the metering rod. Adjust this mix by moving the locating clip up or down on the rod.



The air screw is located on the left side near the mouth of the carburetor and is responsible for low speed fuel mixture.

piston drops the indicated distance according to the specifications listed for your specific model.

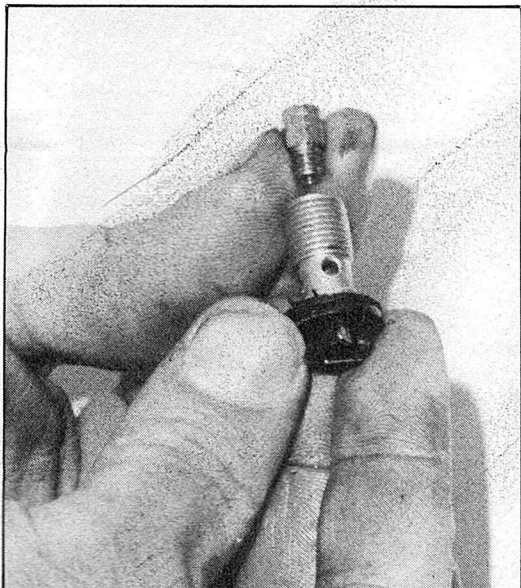
With the piston in this location, the points should be just opening. When the engine is running forward the points will then just open and the spark will be on time. Thus set the timing. If there is a need to change the timing always check timing after you tighten the screws. Once the timing has been set, turn your attention back to the spark plug which was removed and set aside earlier. Examine the firing tip of the spark plug. Look for excessive erosion of the electrodes and excessive carbon build-up inside the plug tip. As long as the spark plug seems to be in good condition, it can be cleaned and re-used. Otherwise

replace it.

The next step is the adjustment of the carburetor. Yamaha motorcycles are equipped with Mikuni carburetors which are reasonably simple to work on, but the novice tuner shouldn't tinker too much with the carburetor until he knows more about what he is doing. To get the engine idling right, set the air screw $1\frac{1}{2}$ - $1\frac{3}{4}$ turns out. After this, adjust the idle speed with the throttle stop screw.

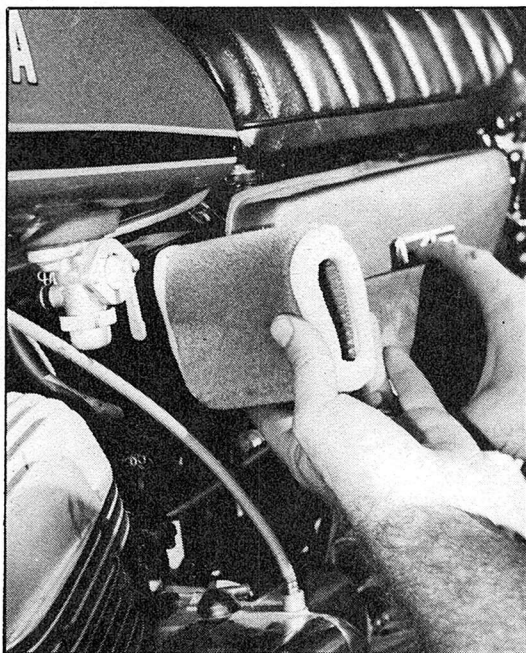
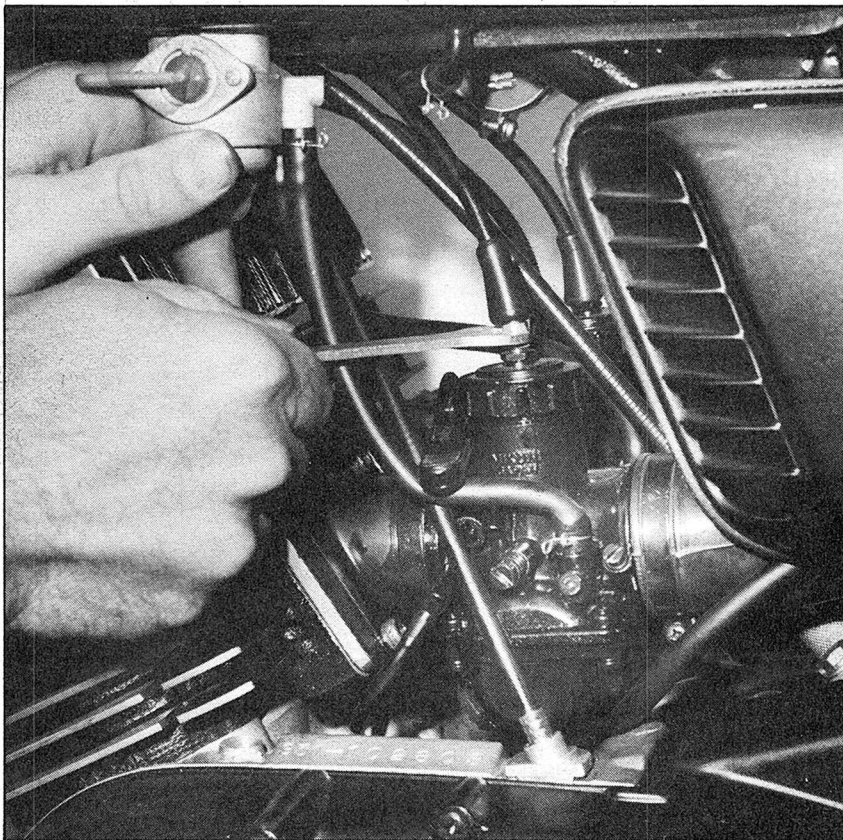
Although the basic tuneup procedures are essentially the same, there are a few differences between the singles and the twins. In the accompanying photos we've laid out the procedures for both the singles and the twins where they differ. Check out the photos and get started.





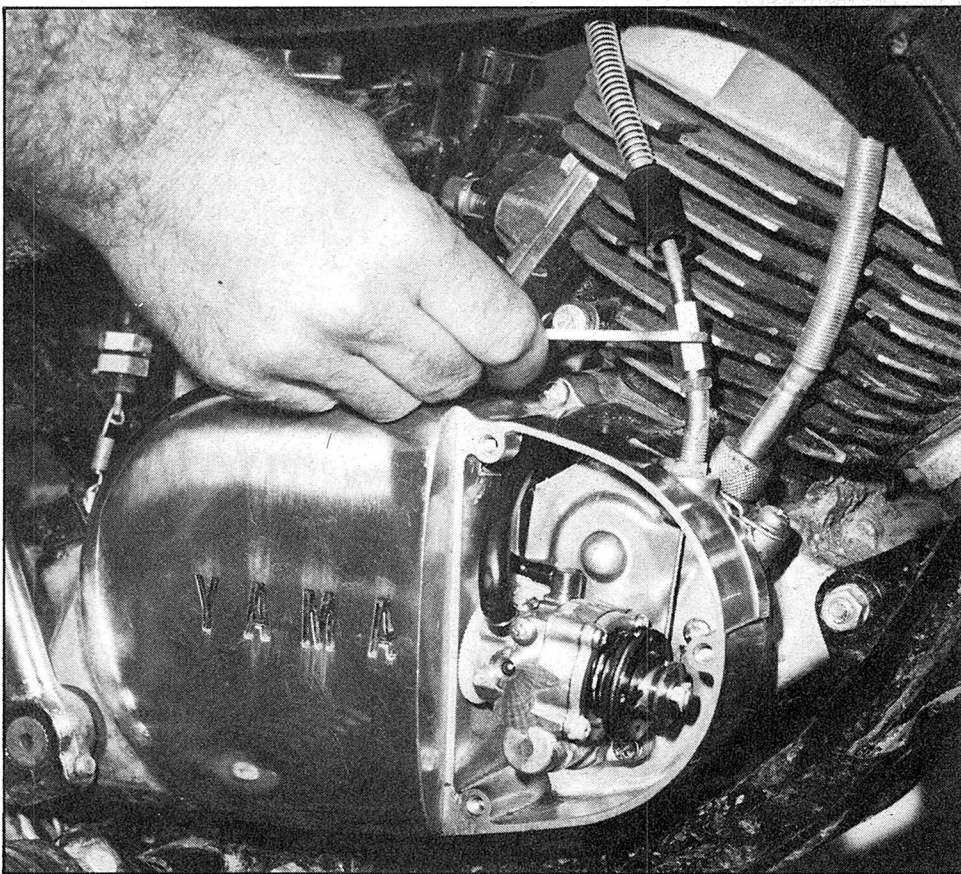
The high speed fuel mixture is controlled by the size of the main jet, located in this main jet carrier at the bottom of the carb.

On the twins, the two carburetors must be adjusted so that they work together with the movement of the hand grip.



Remove the air filter element and clean it thoroughly as part of your regular tuneup procedure.

If the carburetor cable has been adjusted, it may require a re-adjustment of the Autolube system.



Yamaha Ignition Systems

HERE'S A GUIDE TO UNDERSTANDING THE YAMAHA IGNITION SYSTEMS: WHAT THEY ARE AND HOW THEY WORK.

Yamaha motorcycles use one of three basic types of ignition systems. The battery system is used on all of the street bikes and also the 125 Enduro. A flywheel magneto system is used on the rest of the Enduro line, along with the 100 MX. The larger motocross bikes use what is called the Capacitive Discharge Ignition (CDI) system. In this section we will look further into each type of system to see what makes it work, but before we do let's place the role of the ignition system in perspective with the rest of the engine's functions.

The ignition system is, as the name applies, responsible for igniting the fuel mixture in the combustion chamber. This ignition must occur at the exact time needed to produce power from the compressed fuel mixture.

A mixture of gasoline and air is brought into the engine and compressed into the combustion chamber. This compressed mixture is then ignited by a high voltage spark, which bridges the gap between the spark plug electrodes.

The burning fuel mixture produces a great deal of heat which then expands the compressed gases. This expansion forces the piston downward. The force of the downward moving piston is transferred by the connecting rod to the crankshaft, through the transmission, and onto the rear wheel. It is important to realize that this combustion process is

actually a burning process and not any kind of explosion.

The burning of the fuel mixture occurs at a specifically constant rate, so that a certain period of time is required in order for all of the fuel mixture to burn. It is for this reason that the timing of the ignition point is so important.

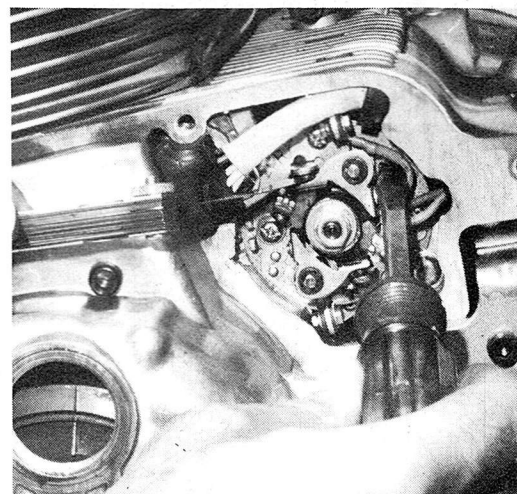
As we mentioned before, a high voltage spark is responsible for igniting the fuel mixture. It is this high voltage spark and the timing of its delivery which serves as the focal point of the ignition system. In each different system this process takes place in a slightly different way. Let's start by looking at the battery ignition system and see how it performs its duties.

As its name implies, the battery ignition system has as its primary source of power a common storage battery. One of the functions of the system is to convert the low voltage from the battery into the high voltage needed to cause ignition of the fuel mixture. This conversion takes place by a process known as electrical inductance.

Although the ignition coil is the heart of this type of system, one of the most important factors for the correct operation is breaker points. The breaker points act as a switch between the battery and the ignition coil.

The breaker points are opened and closed by the lobes of a cam ground surface on the end of the crankshaft. In the battery system the opening and closing of the points has an effect on two factors in the ignition process. The length of time the points are closed affects the build-up of the magnetic field in the primary coil windings. The point at which the points are popped open determines just when the magnetic field

All of the Yamaha twins have a dual point battery ignition system. Each cylinder has its own set of points and secondary coil.



in the coil will collapse and when the ignition spark will occur.

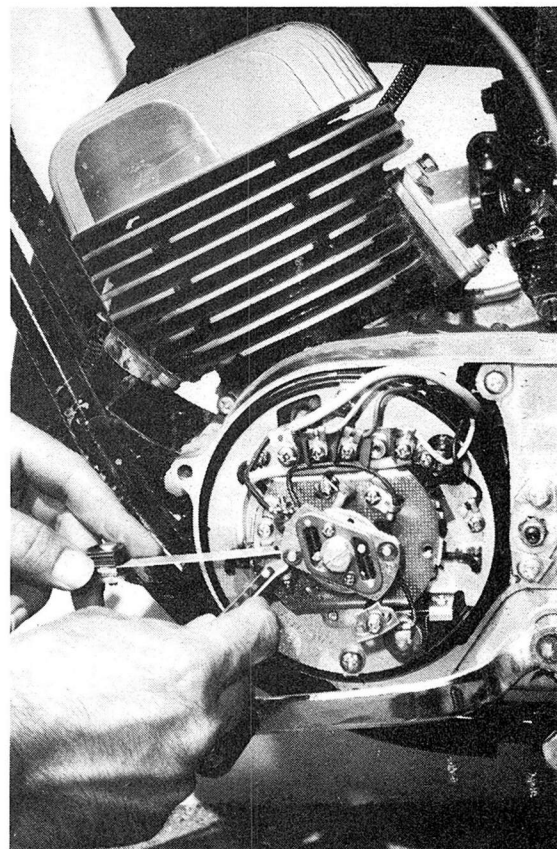
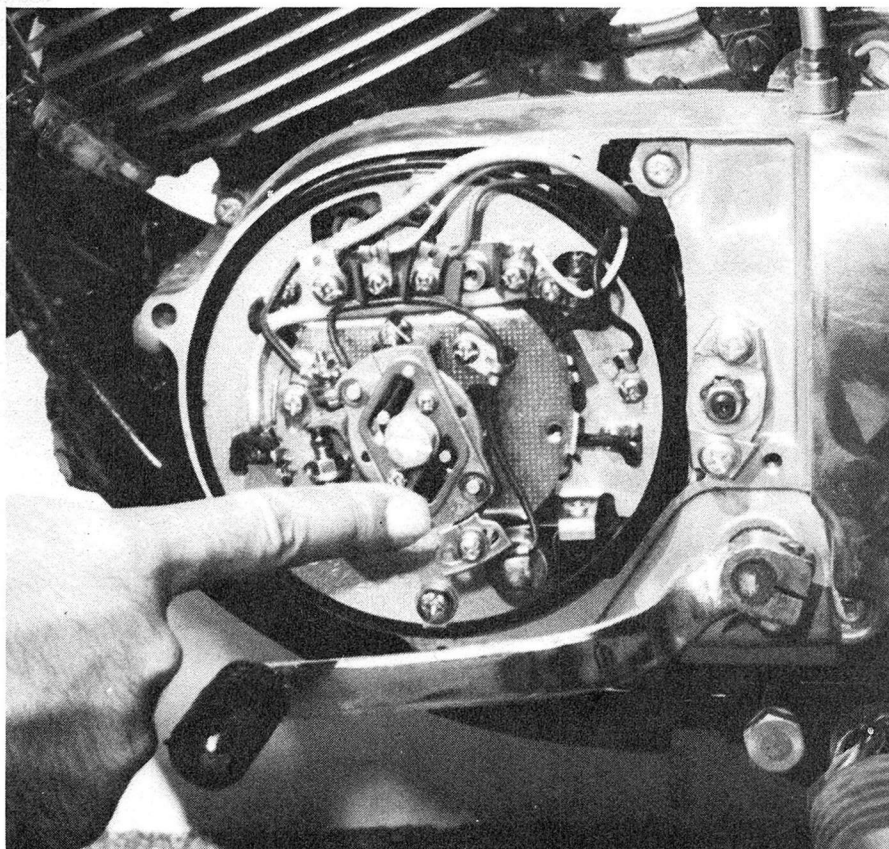
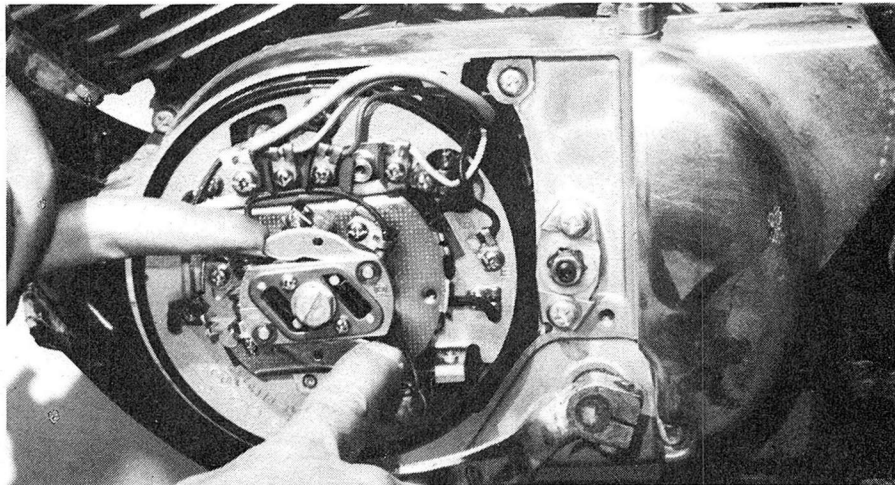
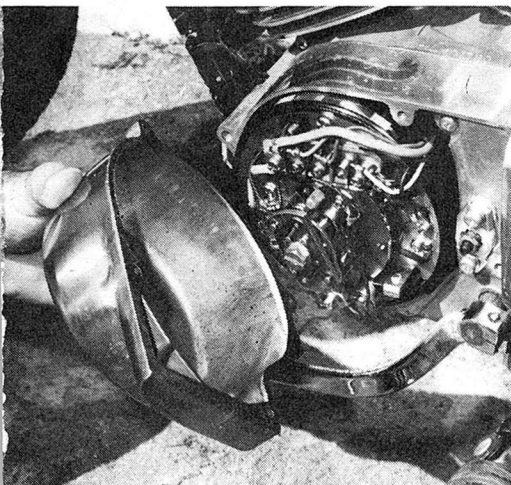
In terms of care and maintenance, two adjustments are usually required to tune a battery ignition system. First of all, the gap between the ignition points must be set to the desired opening. Secondly, the ignition timing is adjusted to cause the points to open at exactly the right time. This ignition timing is done by positioning the point base plate in relation to the point cam. In most battery systems, the point gap is first adjusted and then the timing adjustment takes place. Battery ignitions are most popularly used on street bikes. Since they provide their own power source, starting is easier. Use of lights and other accessories is also less taxing to the system.

One of the most popular systems for dirt bikes is the flywheel magneto. This system is fitted to all but one of the Yamaha Enduro models. In terms of performance as well as compact size, the flywheel magneto has the edge over the conventional ignition systems. Since the primary power source for the battery system is the battery, current flow to the primary windings of the coil occurs at a constant rate. As engine speed increases, however, the high voltage requirement at the spark plug becomes greater and the length of time during which the coil can build up a charge gets shorter. At higher speeds, when the demand is greatest, the battery system actually produces less spark than before. The solution was found in the magneto system.

The magneto system doesn't require a battery and offers the further advantage of providing greater voltage output as engine speeds increase. An

The ignition system in the Yamaha 125 Enduro is more or less unique among the Yamaha line. It is different from the other Enduros because of the electric start feature of the 125 which requires a battery.

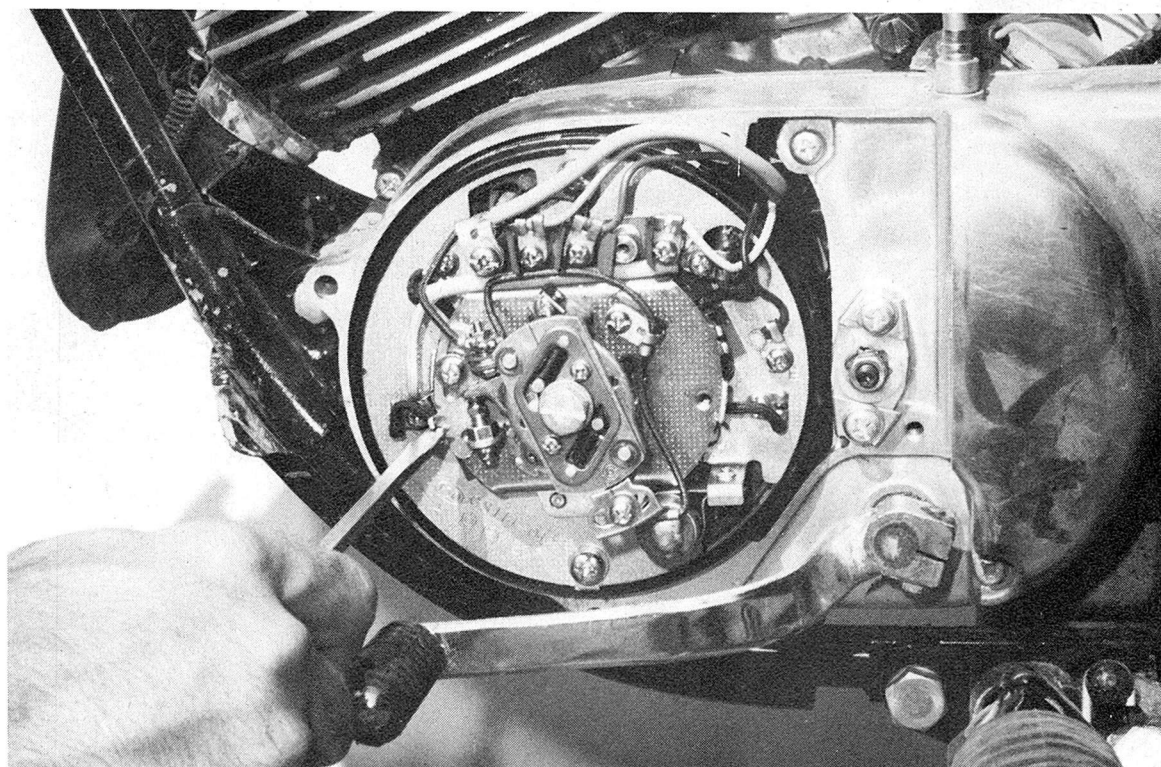
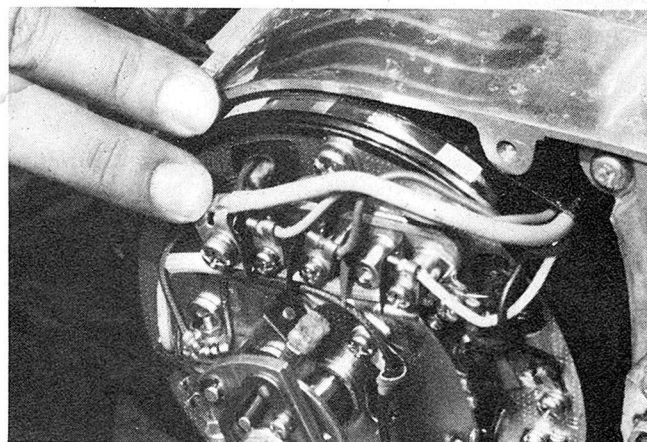
These centrifugal advance weights are drawn outward as the crankshaft rotates faster, changing the positioning of the point cam and advancing the ignition timing.



These timing marks are lined up in order to correctly time the battery ignition of the 125 Enduro.

On the 125 Enduro, the point gap is adjusted separately from the ignition timing adjustment.

The maze of wires that is present in the 125 Enduro system is simplified by a color coded band above the terminals.



The battery system has the timing set by moving the breaker point mounting plate.

ideal combination for performance applications in which light weight is also a consideration. In the common magneto system, breaker points are used to control the transmission of current to the high tension coil and on to the spark plug. The timing of the spark in the magneto system is controlled by breaker points in the same way as a battery system. The same adjustments are required — timing and gapping the breaker points. The magneto system generally requires less frequent maintenance than the conventional system, and the breaker points tend to last longer.

Replacing the magneto in recent years is the system used on the Yamaha MX machines, the Capacitive Discharge Ignition. One of the key advantages of the CDI system is the fact that it uses no contact breaker points. This means reduced maintenance, reduced wear, and maximum reliability.

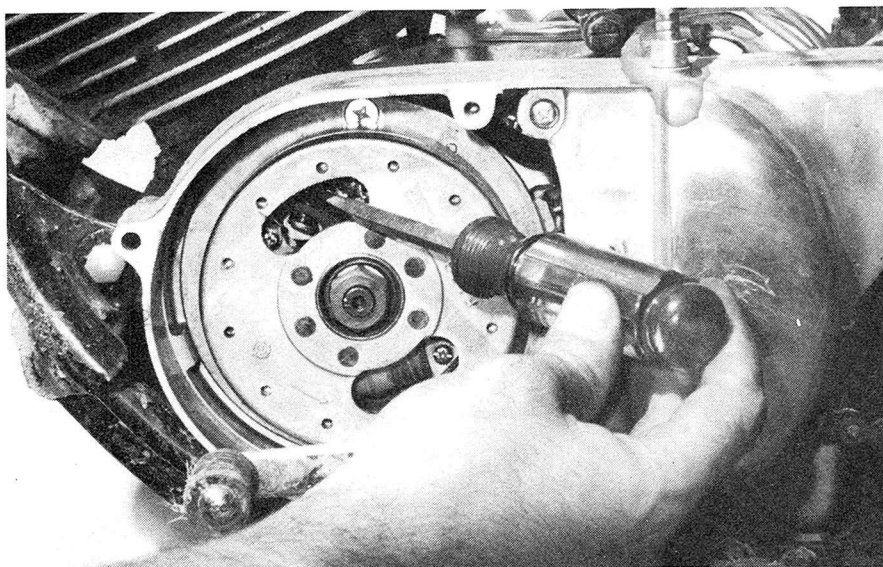
The CDI system is in most respects, very similar to the standard flywheel

magneto system. A magneto flywheel contains permanent magnets, which pass by a primary coil as the crankshaft rotates. A build-up of electrical current is created by the process of electrical induction. From the primary magneto coil, the current goes to a capacitor, where it is stored before being passed on to the high voltage coil and finally the spark plug.

The CDI system employs a small magnet on the flywheel which generates a signal that is picked up by a minute silicon controlled rectifier each time the spot on the flywheel passes. When the rectifier picks up this signal, it discharges the capacitor to start the ignition process.

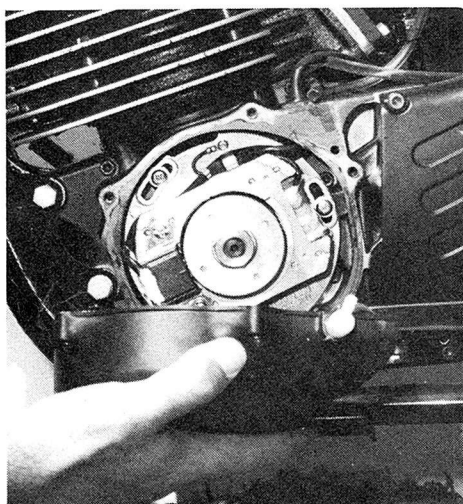
Although the different Yamaha systems each have their own advantages and disadvantages, the key to a proper running engine, in any case, is a well maintained, carefully tuned ignition system. Learn about the system in your machine, and a better running bike could be the result.



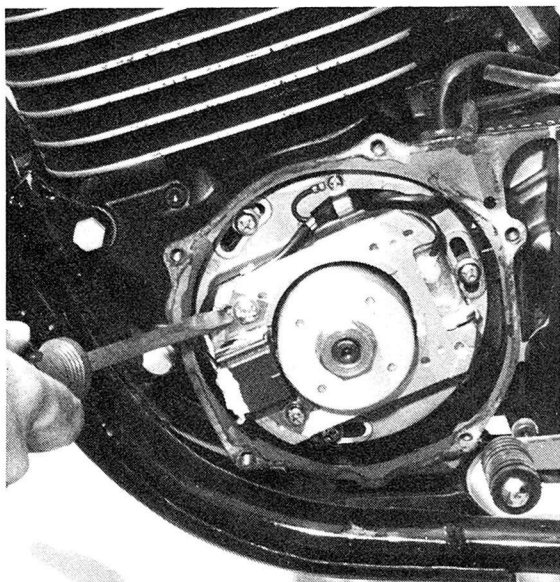
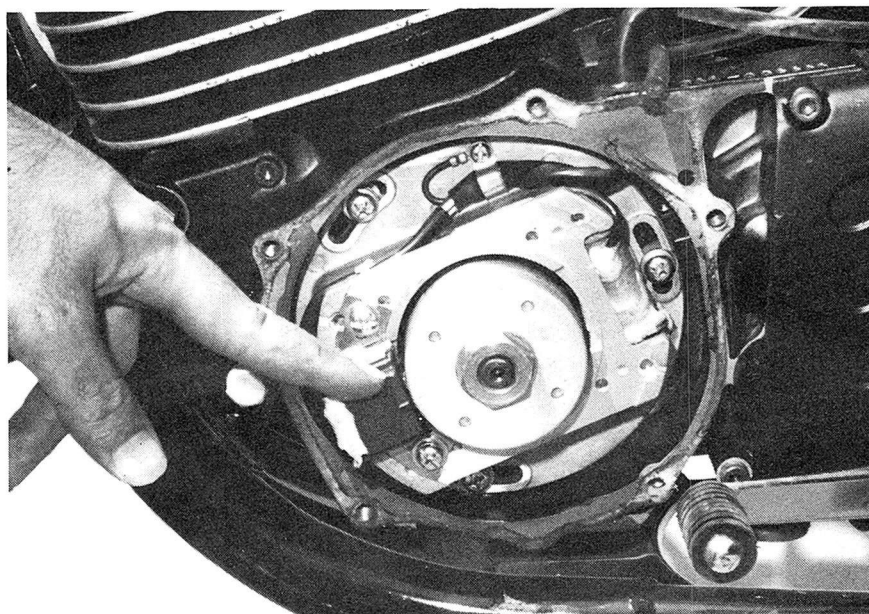


With the flywheel magneto, the timing is set simply by adjusting the point gap so that the points open at the prescribed time.

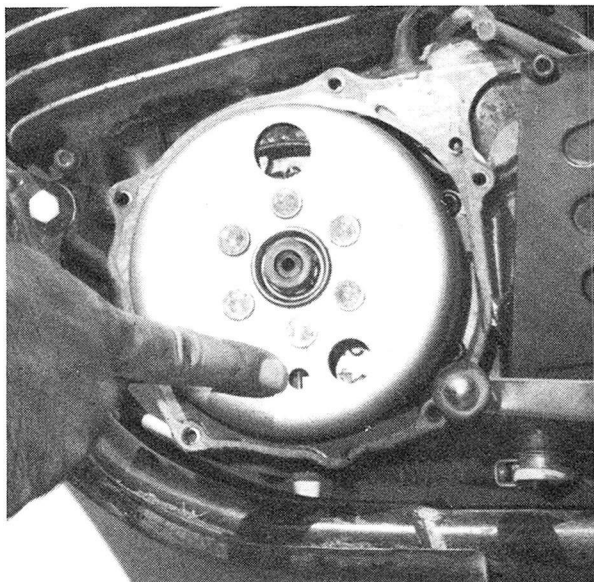
The Capacitive Discharge Ignition system uses this silicon rectifier to release the high voltage charge, instead of ignition breaker points.



The Yamaha motocross bikes feature a very simple and efficient Capacitive Discharge Ignition system.



To time the Yamaha CDI system, first set the piston the required distance before top dead center, then loosen the mounting screws on the rectifier and move it until the scribed lines meet.



The CDI system found on the SC500 looks somewhat different than that found on the smaller bikes, but is basically the same. The timing marks line up in this small hole.

**YAMAHA HAS FEATURED AN AUTOMATIC LUBRICATION
SYSTEM ON THEIR TWO-STROKE FOR MANY YEARS. HERE'S
AN INSIDE LOOK AT HOW IT WORKS.**

UNDERSTANDING THE YAMAHA AUTOLUBE SYSTEM

Yamaha was one of the pioneers in the use of automatic lubrication systems on two-stroke engines. Their Autolube system has, at least in part, been responsible for the acceptance of the two-stroke engine by many people, who for various reasons would not otherwise put up with the hassle and bother of pre-mixing gasoline and oil as is still the case with many currently produced engines. The automatic lubricating system allows the bike to be filled with plain gasoline with the oil being added in a separate tank. But the added convenience that has drawn so many people to the Autolube system is actually only one of a number of advantages that this system offers. In order to properly understand the workings and advantages of the Autolube system, we'll first look at the lubrication requirements of the two-stroke engine and the original lubrication system.

The lubrication requirements for an engine vary, according to the conditions under which it is operating. With the gas/oil pre-mix, however, the same proportion of gas and oil reaches the engine under all conditions. Obviously this mixture must have enough oil in it to cope with the most severe conditions the engine is likely to encounter.

As a result of this situation, two-stroke engines that are lubricated with the pre-mixed gas and oil spend a good deal of their time operating with a lubrication mix that is somewhat less than ideal. This situation means faster carbon buildup, more spark plug fouling, additional exhaust smoke, and increased oil consumption, compared to an engine which always has the correct amount of lubrication.

Another consideration in the pre-mix situation is that the lubrication is drawn into the engine in an amount that is controlled solely by the amount of gas that passes through the carburetor. Therefore, such cases as running down a long hill with the throttle closed will tend to starve the engine of lubrication and has been known to result in engine damage. To sum it up, we have a situation in which the lubrication is controlled completely by the throttle, yet we find that the oil requirements of the engine are not always related to the gasoline requirements. There obviously has to be a better way.

The old scene of the two-stroke bike cruising down the road followed by a heavy cloud of blue smoke was in itself

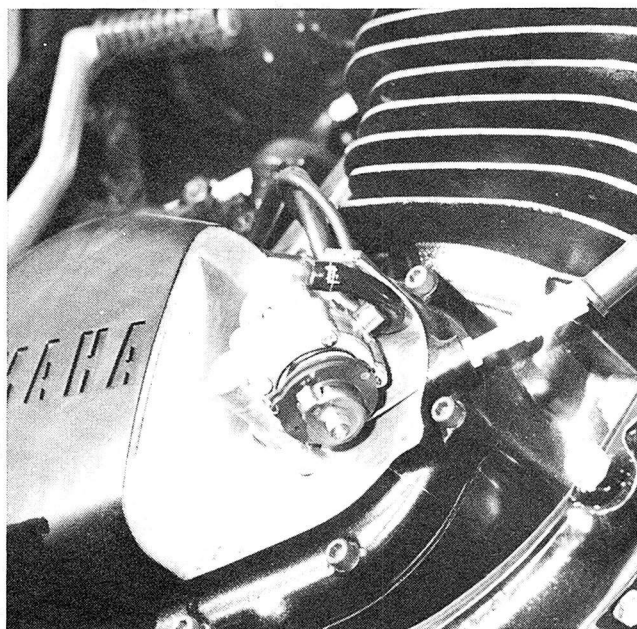
enough to turn off many potential riders. In the face of the current concern for a cleaner environment, it is a situation that would be totally unacceptable. The Autolube system has changed all of this. But in spite of the advantages and popularity, there are many misconceptions and a general lack of understanding about the manner in which they operate. This lack of understanding is often also carried over to the requirements for maintaining them in good working order as well.

From superficial appearances, it would appear that the Autolube system represents an entirely different approach to the lubrication of a two-stroke engine. It is, however, not as different in principle as it might seem. This is not to say that it is not an improvement, but merely that it is not a totally different concept. To better understand how the Autolube system differs from the pre-mix method, as well as the ways in which it is the same, we'll examine the way in which the components of the typical pre-mix, two-stroke gets its lubrication.

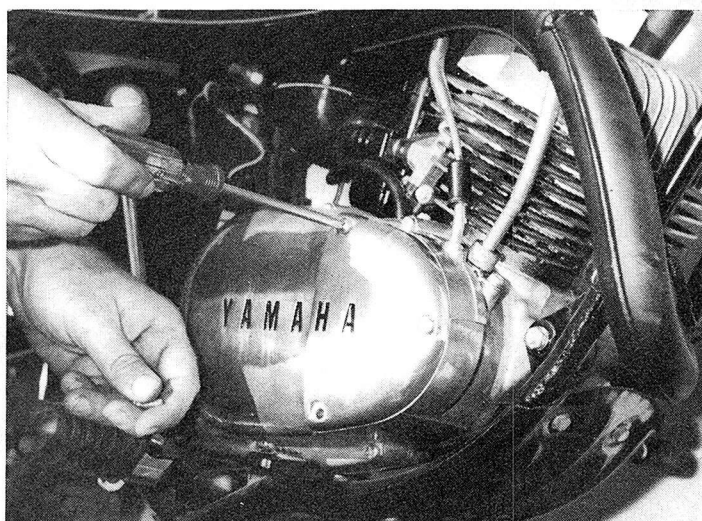
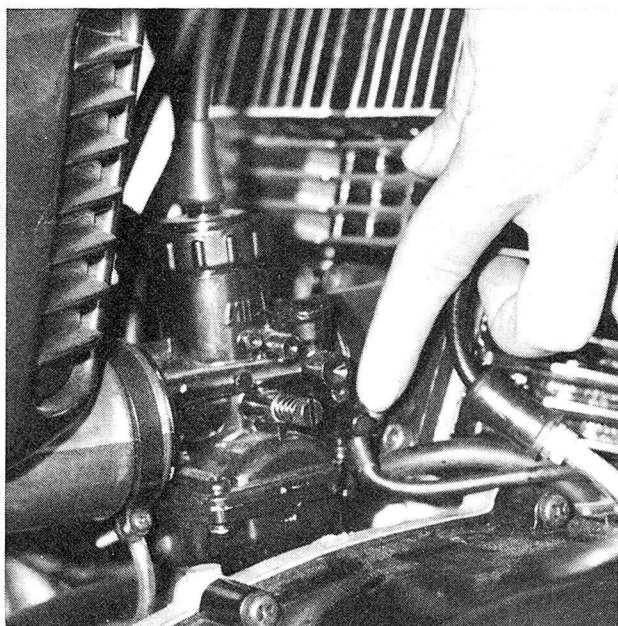
The reason that the pre-mix principle works (and for all of its shortcomings, it does work) is the manner in which the gasoline mixture gets from the carburetor to the combustion chamber. The mix travels directly from the carburetor through the intake passage into a sealed area around the crankshaft. From this area around the crankshaft, it is forced through transfer ports into the cylinder bore, when the piston is near the bottom of its stroke. By the time the piston has traveled back up the cylinder to compress the fuel into the combustion chamber, it has come in contact with every moving part in the engine, including the crankshaft bearings, connecting rod bearings, and the entire length of the cylinder wall. In the process, the oil that is being carried in the fuel has a chance to lubricate everything that moves.

In the basic terms of the lubrication process, the only thing that is different about the Autolube system is that instead of carrying the oil with the gas all the way from the gas tank, the Autolube mechanism injects it into the gas mixture in the intake passage, just after the gas leaves the carburetor. The big difference in the Autolube setup is that the amount of oil injected into the gas flow is varied, while the engine is running, to meet the specific needs of the

The heart of the Yamaha Autolube system, this is the device that meters the flow of oil to the engine.

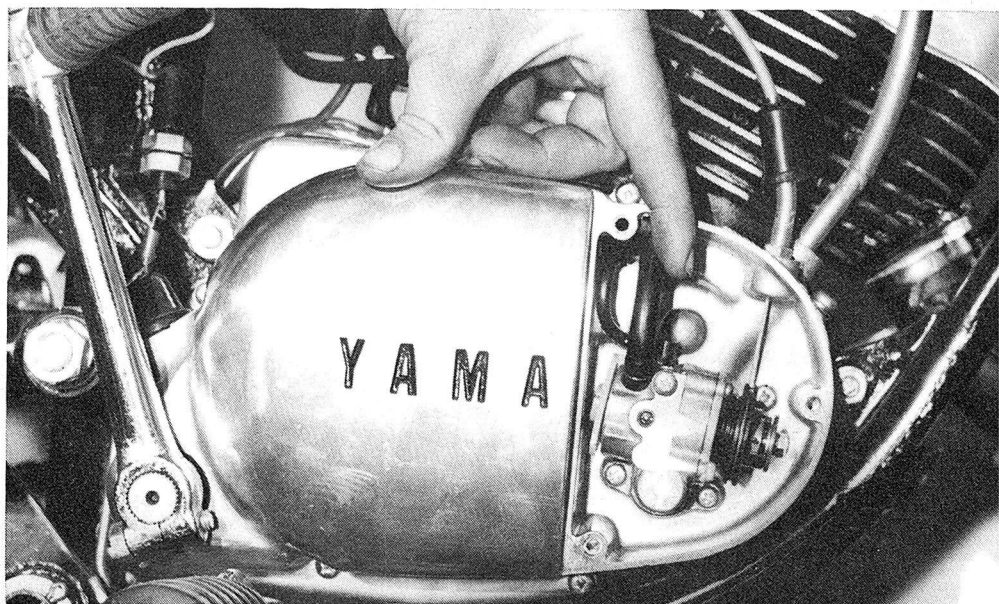


The Autolube system for the twin two-strokes differs mainly by the fact that it is designed with two oil delivery lines.

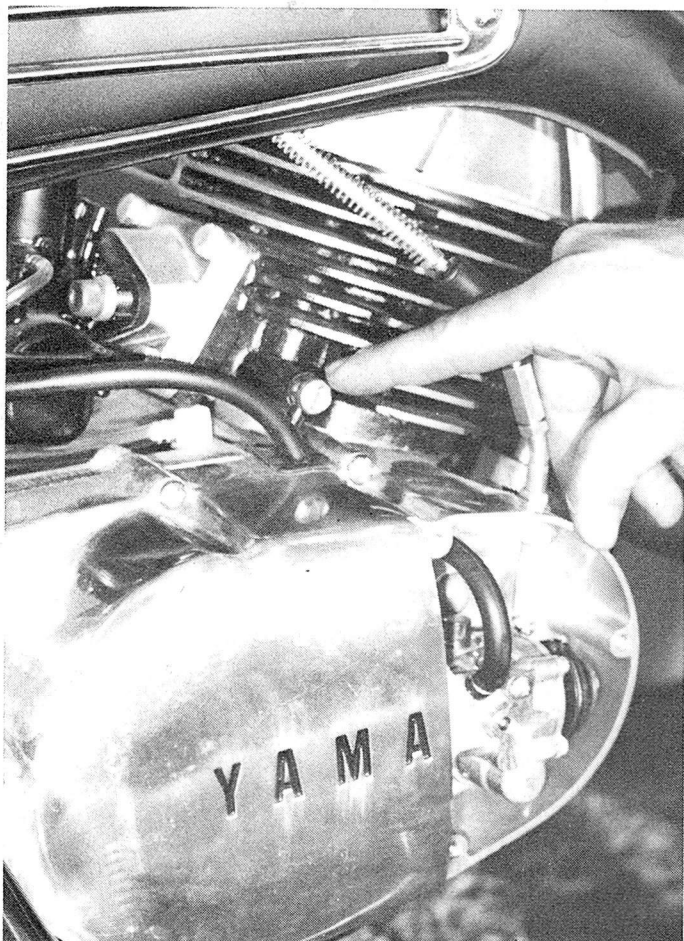


On the Enduro singles, the Autolube unit is located behind this right side engine case cover.

The Yamaha twins have an oil injection line and fitting for each of their two cylinders.

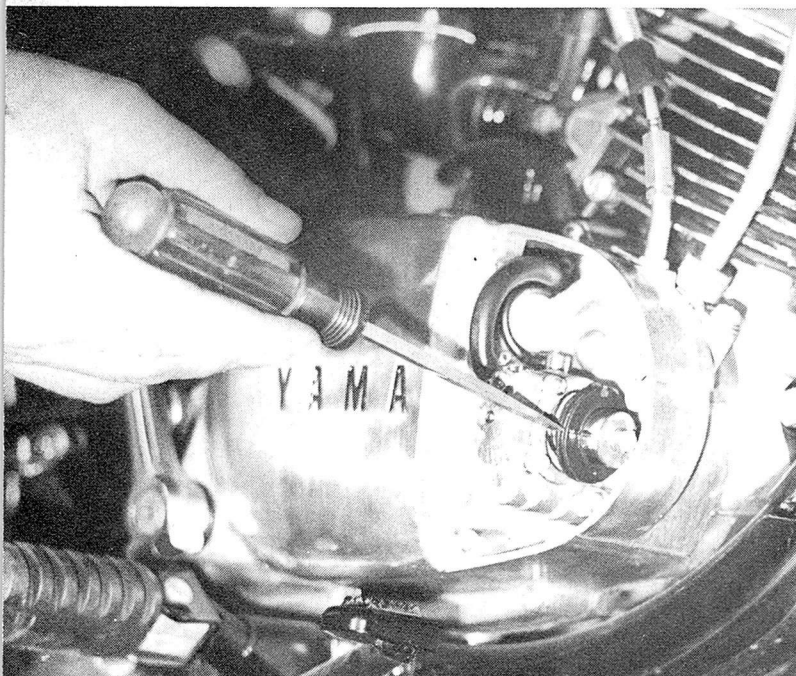
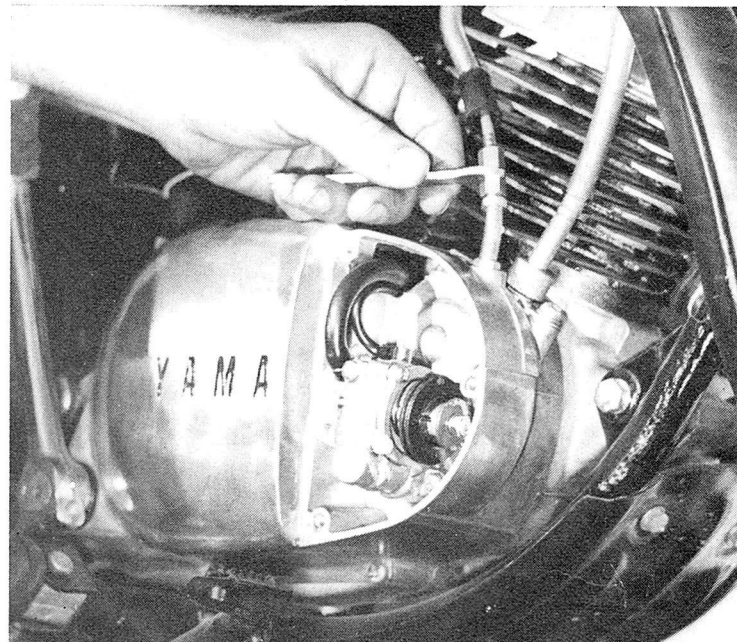


The largest hose that runs to the oil injection unit is a supply hose from the oil reservoir tank.



The oil injection hose which supplies oil to this single, connects to the right side of the inlet track.

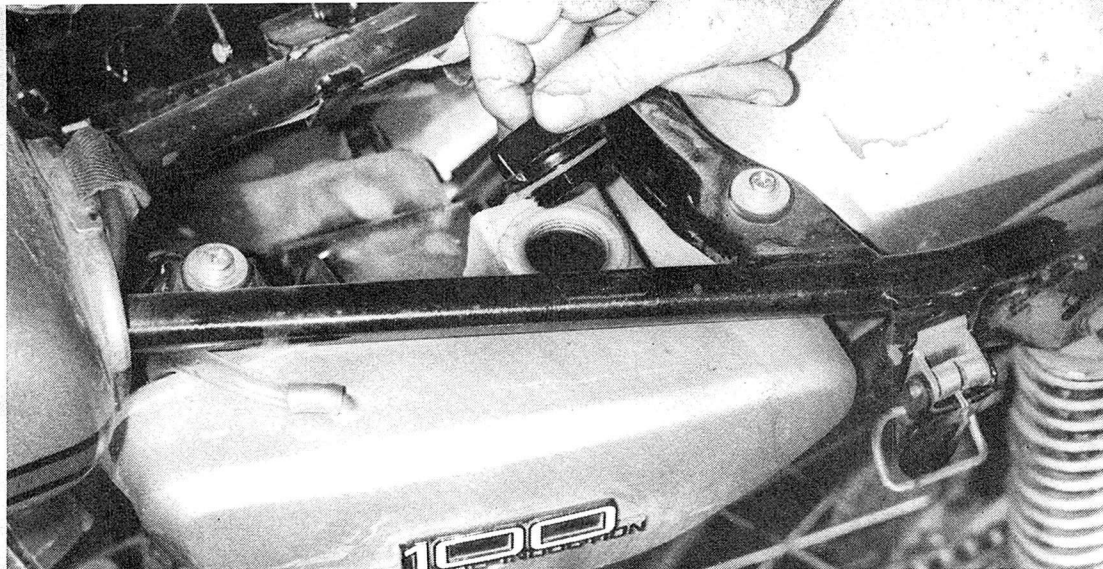
The throttle controlled valve is adjusted at this point by loosening the lock nut and turning the adjuster.



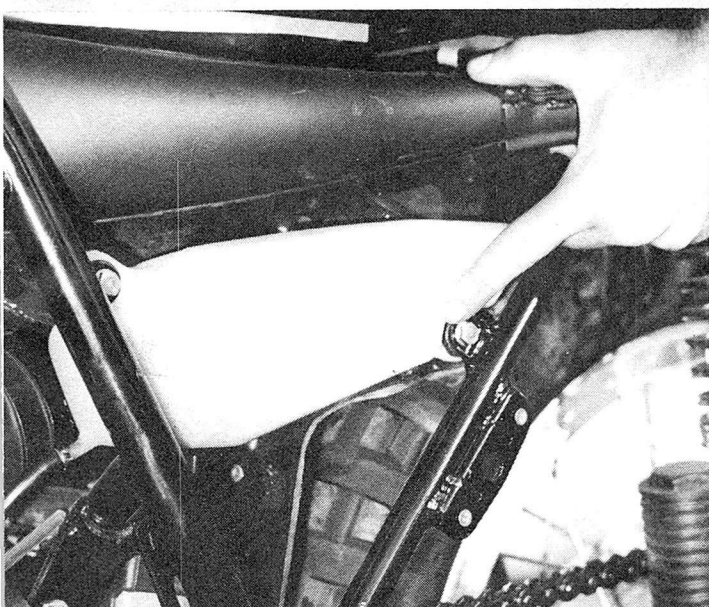
The correct adjustment is achieved when the pulley adjustment marks line up with the stationary pin.

On most of the Yamaha Autolube equipped bikes, a window like this is used to show a low oil level in the reservoir.





On most of the models, the oil reservoir is filled through this inlet under the seat.



The Yamaha motocross models use a reservoir located behind the fiberglass side cover on the left side.

This handy swing-out rubber filler hose makes filling the motocross oil tank a much simpler job.



engine at any given point in time.

The advantages of the Autolube oil injection system are not so much from the method of getting the oil to the engine, but from the method of controlling the volume that is delivered. If the system is adjusted properly, oil is supplied to the engine as it is needed. Not too much for one speed or too little for another. The key to the delivery of oil to the engine is the oil injection unit.

The injection unit is driven off of the crankshaft and the engine speed thus affects the delivery of oil in two ways: the speed at which the unit is driven and the amount of vacuum that is present in the intake passage. It is the vacuum that is primarily responsible for moving the oil. This factor is important, since in most systems little oil will be moved by the injection unit alone without the aid of the engine vacuum. This makes it important for the system to be properly maintained. A leak in an oil line or an oil reservoir vent that is blocked can cause the system to malfunction.

In addition to the effect of the speed of the engine, oil distribution is further controlled by the connection between the pump and the throttle. The more the throttle is opened, the greater the amount of oil that will be distributed by the

pump at any given engine speed. The manner in which this throttle connection combines with the effect of the engine speed is what results in the unique qualities of the system.

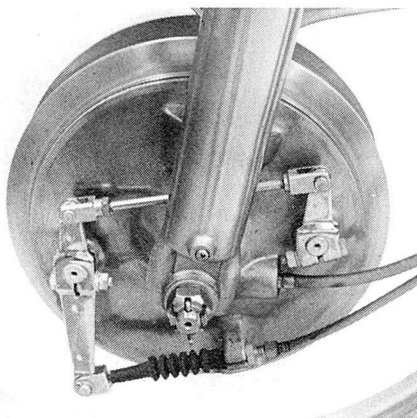
There are only two basic adjustments that need to be made occasionally to the Yamaha Autolube system in addition to making sure that all of the fittings are tight and such. The first is the throttle controlled valve. This is controlled by adjusting the cable that runs from the oil injection unit to the throttle. This adjustment is made at the point where the cable enters the engine case.

With the throttle closed, adjust the cable so that the adjustment mark on the valve lines up with the stationary pin. The second adjustment controls the free play in this valve. The shop manual will list the tolerances and the free play is measured with a feeler gauge. Adjust the free play by removing the small pulley and adding or subtracting shims to reach the clearance that is called for. Adjusted and maintained properly, the Autolube system will do a good job of providing lubrication for your engine. Besides eliminating the need for mixing oil with your gasoline, this system cuts carbon build-up and reduces spark plug fouling. That's a pretty good bargain for such a small package.



OFTEN TAKEN
FOR GRANTED, YOUR
BRAKES MAY BE
THE ONLY THING
THAT CAN KEEP YOU
FROM DISASTER.
LEARN EVERYTHING
YOU CAN ABOUT
THEM AND KEEP
THEM WORKING THE WAY
THEY'RE SUPPOSED TO.

INSIDE YAMAHA BRAKES

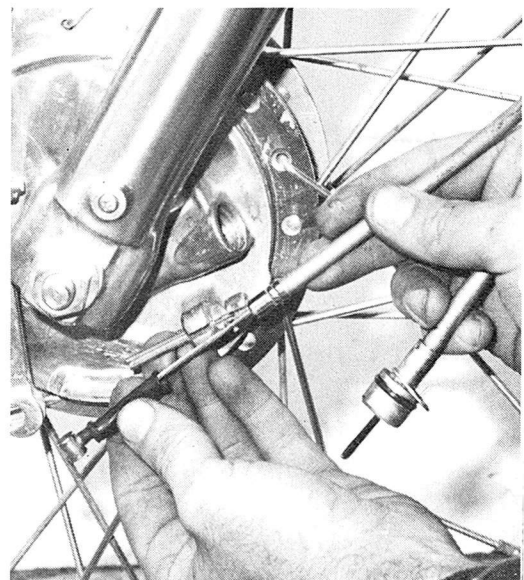


If we were able to make a spot check of all of the motorcycles in use today, we would probably find out that there are many machines being operated with brakes which are working at less than their maximum efficiency. A bigger shock would be to discover how many of the riders of these bikes were not aware that their brakes were not working as they should be.

Most of us rarely use all of the capacity of our brakes until we are in an emergency situation. The capacity of a brake doesn't disappear suddenly. It gradually diminishes as the brake is used. In many cases the rider, just as gradually, compensates for his diminishing braking power, usually without ever realizing that he is doing so. For this reason, it is important that you make a regular inspection tour of your brakes and adjust, repair, or replace whatever needs attention.

Yamaha motorcycles are equipped with one of two basic types of brakes: internal expanding shoe brakes or disc type brakes. Of the new machines the 750, 650, 500 and 350 street models are equipped with the disc brakes on the front wheel and internal expanding shoe type on the rear. The remainder of the Yamaha line has the internal expanding type brakes at both the front and rear.

A

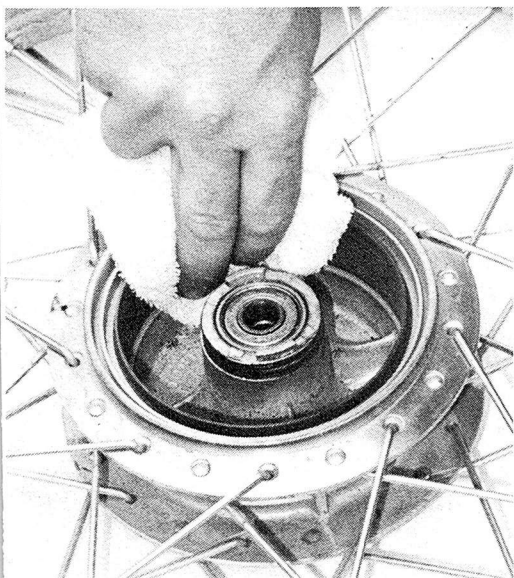


Generally, all that is required to dismantle a brake setup is to remove the wheel and hub assembly. This requires detaching the strap or arm that is between the brake hub and the front fork arm or rear swing arm. Brake cables and a speedometer cable (if there is one) will also have to be removed from the hub. Finally, the axle bolt has to be removed and the entire wheel assembly can be slipped out.

With the wheel out, the wheel hub and backing plate assembly can be lifted out of the brake drum. Be extra careful at this stage to keep track of any washers, bearings, spacers and other similar items, remembering where they belong.

Once the brake assembly is apart, clean the accumulation of dust and dirt from inside of the brake drum. This accumulated dust can in itself prevent the brake from working as it should and can also put a glaze on the shoes that will make them noisy and ineffective.

Once the drum is clean, examine the braking surface for excessive wear, roughness, or other signs of damage. The interior of the drum should be smooth and basically round, but slight irregularities may not cause any problems. When you are satisfied that the brake drum is in good condition, you

B

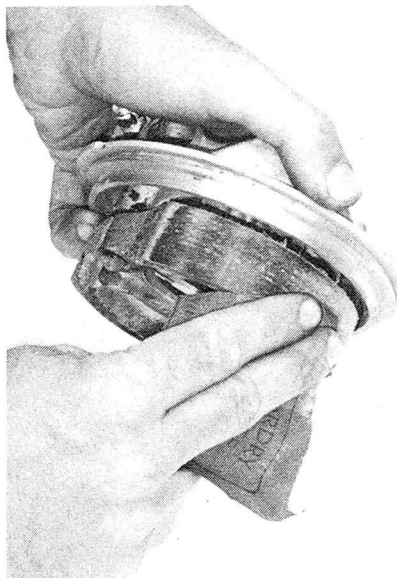
can move on to the backing plate and brake shoes.

First, check to determine how much lining material remains on the brake shoes. If the lining is getting a bit thin at any point on either of the brake shoes, the brake linings should be replaced. Use a stiff bristled brush to brush the accumulation of dirt and dust from the interior surface of the backing plate. Check to be sure that the return springs are in good condition and make sure that nothing is binding inside the brake assembly.

If the brake shoes have developed a glaze on their surface, the glaze can be removed by sanding the surface of the shoes carefully with a fine grade of sandpaper. Before reassembling the brake, a small touch of very high temperature lubricant can be put on the brake shoe pivot point and the rubbing surface of the brake activating cam.

After the brake assembly has been re-installed on the bike, check to be sure that the outside activating arm is attached to its shaft so that there is an angle of less than 90 degrees between the arm and the brake cable or lever. When everything is back together, adjust the brake and you're ready to ride.

The disc brake assembly is a bit more complicated to work on than the

C

standard shoe-type brakes and most riders will probably leave major service operations on this item to their dealer. If not, it is a worthwhile investment to purchase a service manual for your particular model. The disc brake is an extremely effective type of brake.

As a result of the additional pressure needed to work the disc brake setup, all Yamaha disc brakes are hydraulically operated. This hydraulic system is, in principle, just like the one in your car. The master cylinder is mounted on the handlebars and is activated by the hand lever on the right side of the bars. Pressure on the hand lever forces a piston forward inside the master cylinder. This forces hydraulic brake fluid from the reservoir in the master cylinder through the brake lines to the wheel cylinder, which is actually part of the brake caliper. When the additional fluid enters the brake caliper it causes the two brake pads to be squeezed against the disc, which rotates with the wheel. There are several key areas in the hydraulic disc brake system that need attention at regular intervals.

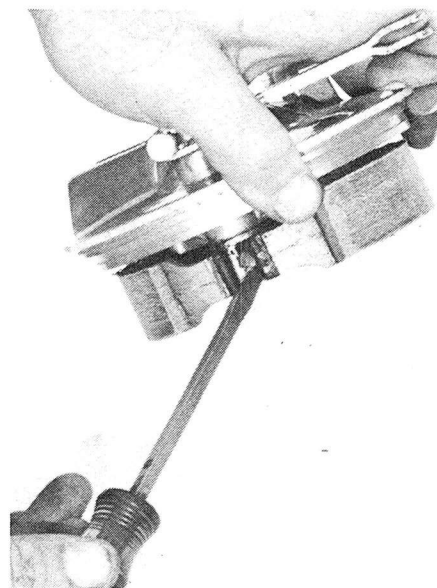
The first is the brake fluid, and the fluid system. The brake fluid reservoir is located in the master cylinder on the right side of the handlebars. Keep an eye on the fluid level, and if fluid starts to disappear it probably means

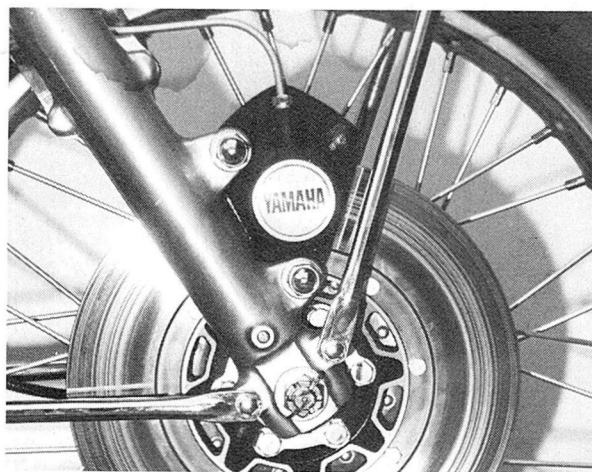
A) The first step in removing the brake assembly is to remove cables and other fittings.

B) With the backing plate removed, wipe all of the accumulated dirt and dust from the brake drum.

C) If the shoes are worn, replace them. If glaze is present, it can be removed by sanding the surface with a fine grit sandpaper.

D) A touch of very high temperature grease, applied to the pivot points and activating cam will smooth operation and increase life.

**D**

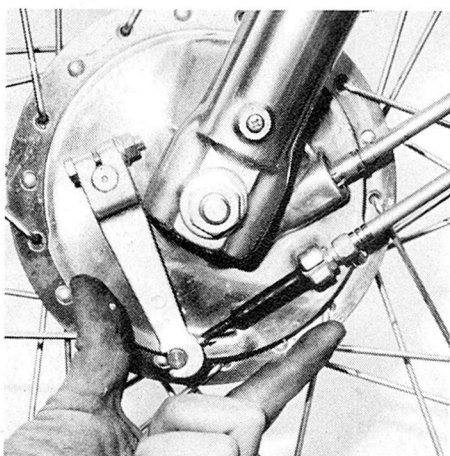


F) This disc brake makes a very efficient stopping unit for a bike, but presents its own type of maintenance problems.



G) The disc brake unit is operated by hydraulic fluid which is held in this reservoir at the hand lever operated master cylinder.

H) These slots keep the pads positioned and allow pad wear to be inspected without removing the pads.



E) Be sure that the angle between the brake activating arm and the cable or arm is less than 90 degrees. If not, pull the arm and reposition it.

that the system needs an overhaul. Seals, pistons, valves and springs are affected by age and use. This requires the rebuilding of the master cylinder and caliper periodically.

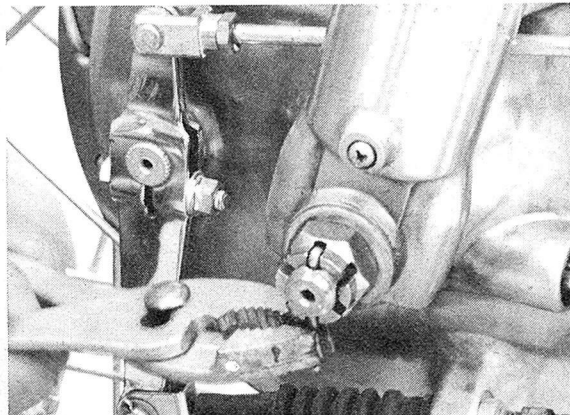
Like the shoes in the internal expanding type brakes, the brake pads in the disc unit wear and must be replaced occasionally. Basically the job is not a difficult one. The caliper must be removed from its fork bracket. Then the pad can be slipped out and the new pads slipped in. Any time you loosen or remove a fluid line, the system should be bled to remove any air bubbles from the fluid.

Finally, the disc itself must be perfectly true and be free from serious scoring or other surface damage, if the unit is to function correctly. Examine the surface of the disc regularly and have the disc checked for excessive run out with a dial indicator regularly.

Brake maintenance is not difficult, but it is important. Take the time to learn how your brakes work. Inspect and maintain them carefully. Don't wait until you can't stop to do something about your brakes. Make them part of your regular routine. Your life could depend on it.



An adjustable crescent wrench may not be the most glamorous tool, but it'll do nicely to loosen and remove the axle nut. The clamp bolts may hold the axle, but it's safer to hold its hex with pliers.

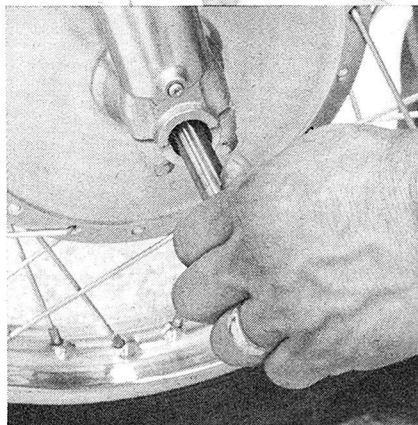
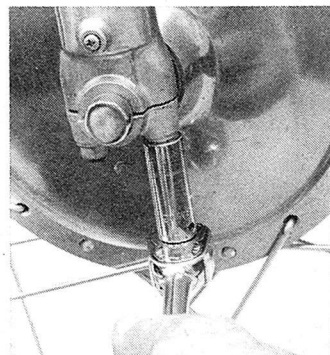


Block up the frame, just beneath the crankcase, with a sturdy wooden box (milk cases seem common enough) so the front wheel is a few inches off the ground. Pull the cotter pin from the front axle nut.

IF YOU EXPECT
YOUR STOPPING
ABILITY TO
MATCH YOUR POWER,
YOU'LL HAVE
TO REBUILD YOUR
BRAKES THE RIGHT WAY

REBUILD FOR BETTER BRAKES

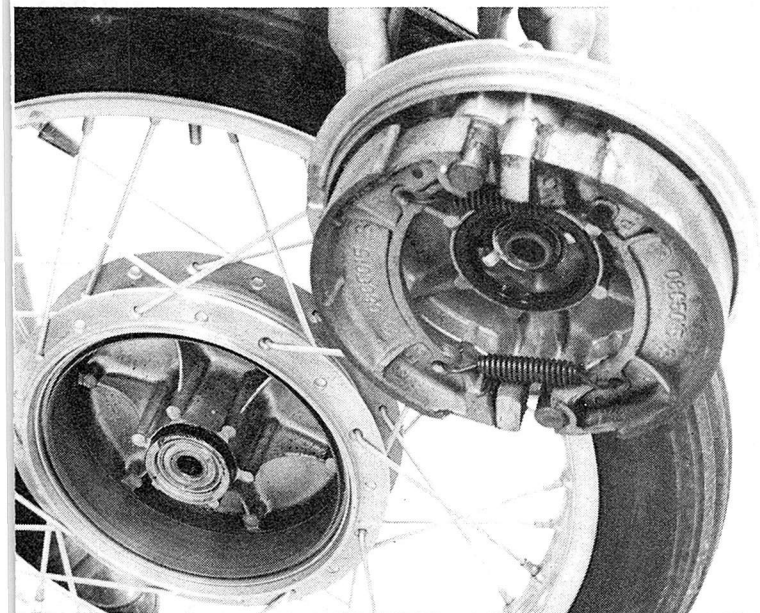
Loosen the nuts that hold the axle clamps to both fork leg bottoms, but don't remove them. The axle should be free to slide out of the forks. The lightened front end will allow the machine to rock back so watch it!



The day of the disc brake is upon us. It's about time, too, that the high performance machines had stopping capacity that is as lasting as their unlimited ability to accelerate. Your machine's braking system certainly deserves as much attention as its carburetors and other power-oriented maintenance areas. If you've ridden your Yamaha far enough to burn through two or three changes of spark plugs, then it's time you took a look at the stoppers, too. The 250cc and 350cc roadsters are fitted with the most complicated appearing braking system in the Yamaha line, so we'll concentrate on these. The brakes on the other, smaller displacement, roadsters and all of the dirt bikes are even easier to work on. The 250 and 350 twins have what is termed a "double leading shoe" front brake. This system provides a bit more stopping power and a more reliable feel at the hand lever than the single leading shoe drum brakes on all the other Yamahas. It's the type of braking system that all the road racers used before their speeds demanded the fade-free quality of discs. The essential difference in performance between the double leading shoe drum brake and a similar size (in square inches of lining-rubbed area) disc brake lies in the disc's greater ability to dissipate heat. If the heat becomes too great the brake drum (or caliper, on a disc set up) expands so far and the lining becomes glazed so hard that the brake's action begins to, quite literally, fade away. For road riding, then, the double leading shoe brake is as good as a disc brake for most riders.

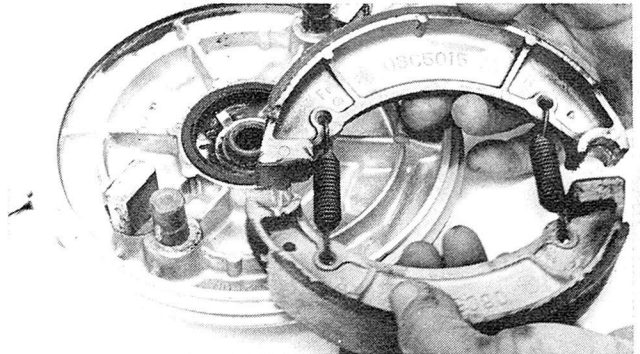
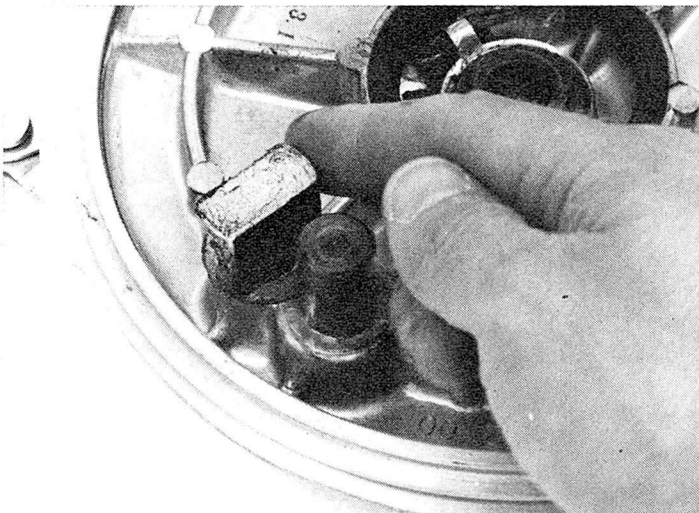
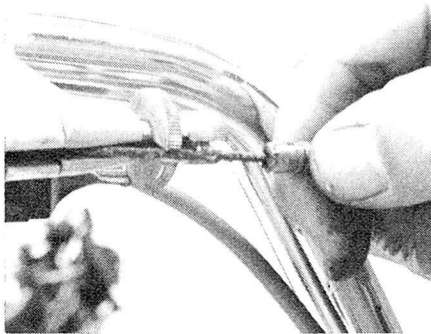
The single leading shoe brakes have a single cam and lever

Pull the front wheel and brake just far enough away from the forks so the brake backing plate can be lifted out of the hub. The speedometer cable can be disconnected at the brake backing plate if you wish.



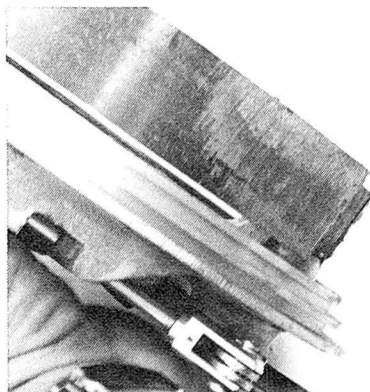
The brake backing plate can be placed on the bench for disassembly if the linings are worn beyond the limits indicated in the factory manual. Pry behind the brake shoes with a screwdriver and they'll snap off.

It's easiest, now, to remove the brake cable by pulling it out of the handlebar lever end. Turn the knurled lock nut and the smaller hex adjusting nut so their notches line up with the notch on the lever.



Wipe a thin layer of grease on the cams and pivot points. Snap the return springs back in place on the two shoes and slip the complete two shoe assembly back into place on the brake backing plate as shown.

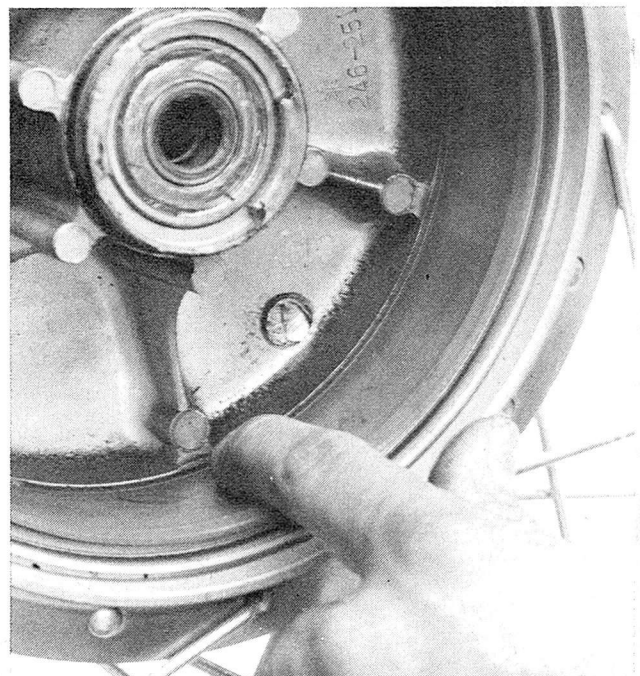
Clean both brake shoes (but not the lining material) with gasoline or solvent. Yamaha dealers and auto parts stores have special high-melting point grease for use on the cams and pivot points. Buy some and use it.

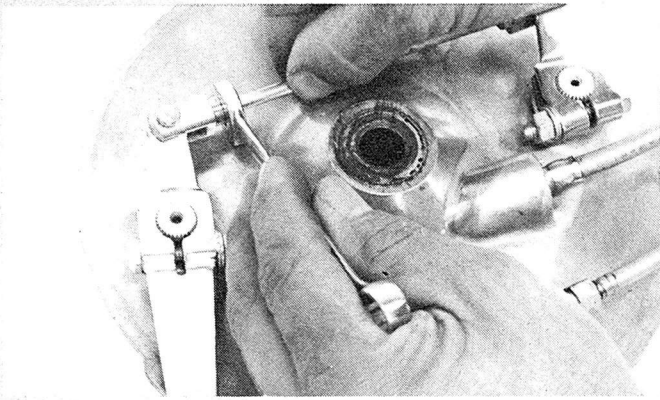


Take a close look at the side of the backing plate and brake shoe

assembly to be sure you've seated both shoes tightly against the backing plate. Try the action with the lever to see that it's working.

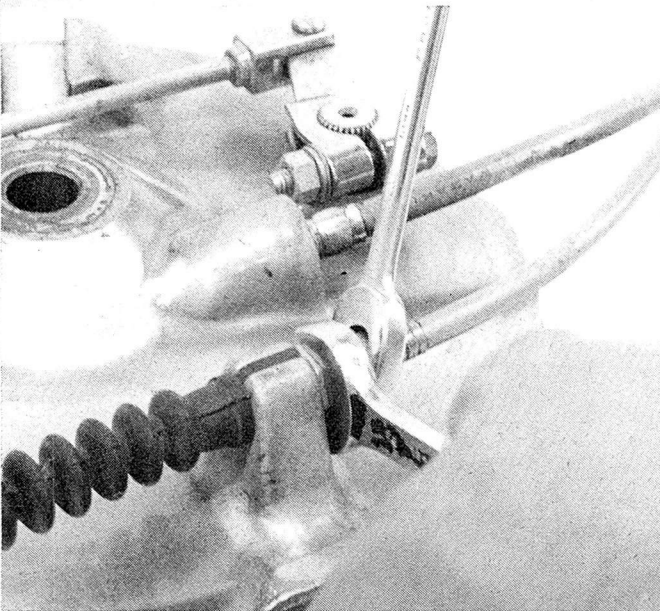
If the brake shoes were so worn that the metal was rubbing the brake drum, the inside of the drum must be scored. Your dealer can tell you if it needs to be machined or if the hub must be replaced.





Adjust the link rod between the two actuating levers (on the double leading shoe brakes only) so that both cams pivot at the same instant when the cable actuated lever is operated. Check the action at the shoes.

The handlebar adjuster should be close to the lever mount with a new cable. Minor adjustments can then be made with the knurled nut. Leave about a quarter-inch of free movement before the brake pivots operate.



Replace the brake, the front wheel, and the axle. Tighten all of the assembly bolts. Adjust the amount of cable slack at the brake. If either the inner cable or the cable casing is worn replace them.

to pry the two brake shoes apart and into ever-tighter contact with the inside of the brake drum. The rotation of the drum tends to pick up the cam end of the rear (or top) shoe to give some built-in mechanical power boost. This shoe tends to share the greatest proportion of the braking loads so that, on many machines, its brake lining material may well be a bit hard for less wear and there is less likelihood of heat-created fade from glazed or softened lining. The double leading shoe system used on the 250 and 350 twins is designed with actuating cams for both brake shoes so they share the braking effort equally. Both brake shoes, in this design, are mounted so the rotation of the brake drum tends to pull them up from their cams and to press them back against their anchored pivot ends. The double cam mechanics make the design virtually twice as complex (if such a simple device can be called complex) because two cams, two anchor pivots and two actuating levers are required—the use of two shoes and a single drum is a common quantity for either single leading shoe or double leading shoe brakes.

There's very little extra maintenance required on a machine with double leading shoe brakes. The link between the two levers is the only "extra" adjustment. All Yamaha drum-style brakes are actuated by a single cable (or rod, at the rear). The owner's manual for your particular machine will give the minimum amount of lining thickness that can remain on each shoe before the brakes must be rebuilt. Be sure to check the lining thickness at both ends and in the center of both brake shoes. Often, the ends of the lining will



wear a bit quicker than the center if the brakes have had severe use. Repair is usually simple enough. Replace the complete brake shoe pair with new ones. Never try to "save" by replacing only one shoe. You may lose the entire machine when the brakes fail to slow you soon enough. Check the inside face of the brake drum for deep grooves. If the drum is grooved your dealer can check it to see if it can be turned smooth in a lathe or if the complete hub must be replaced. If you check for lining wear before the lining wears so thin the metal brake shoe can score the drum, you shouldn't have to worry about replacing brake drum/hub assemblies.

Your tool kit will have the few wrenches, pliers and a screwdriver needed to remove the brake shoes and replace them with new ones. It's a good idea to wipe the brake drum and the working parts of the brake clean with a gasoline soaked rag. Keep the gasoline and other solvents away from the brake linings, however. Your dealer, or any automotive parts store, can supply special high-melting point grease for brakes. Buy some and apply an even layer to the brake shoe anchor pivot, the actuating cam and mating surfaces on the ends of the brake shoes, and to the pivot points and bearings for the external actuating levers. You can apply a bit of lubrication to the front wheel bearings while you're working with them. Double check the brake actuating cable, too, for any single cable strands. If you find even one loose wire at either cable end, replace the inner cable. If the outer cable has any sharp bends, replace it as well. Lubricate the cable and the hand lever pivot and you're set.



TWO STROKE TOP-END MAINTENANCE



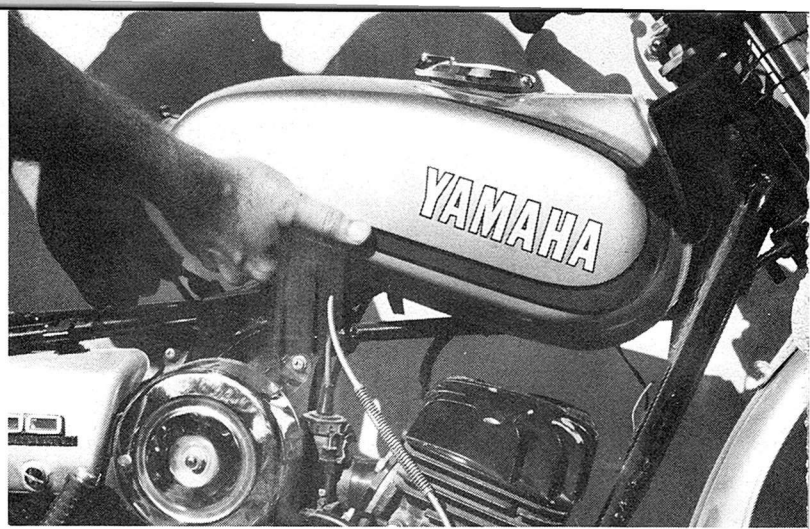
PERIODIC MAINTENANCE OF THE TOP END
ASSEMBLY OF YOUR TWO-STROKE ENGINE IS
ESSENTIAL TO KEEP IT PERFORMING AS IT SHOULD.

Although automatic oil injection systems have cut down the rate of carbon accumulation in today's two-stroke engines, the accumulation still occurs. To keep a two-stroke engine working properly, the top end assembly, including the cylinder, cylinder head, and piston, should be disassembled and de-carboned periodically.

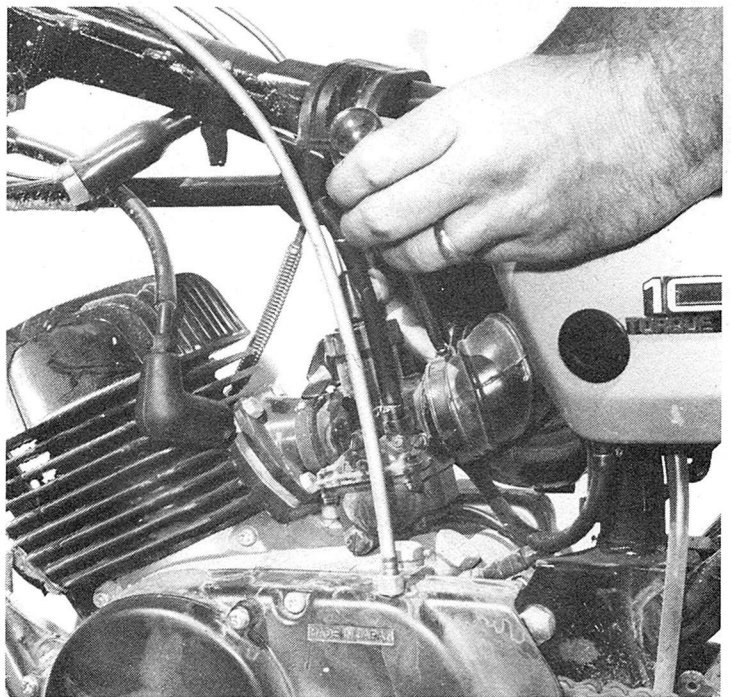
The job (requiring a minimum of special tools) is not a difficult one, if care is exercised. In this section we will outline the complete step by step process, from start to finish. Just follow the photos and you should have no trouble in completing a successful job.



TWO STROKE TOP-END MAINTENANCE

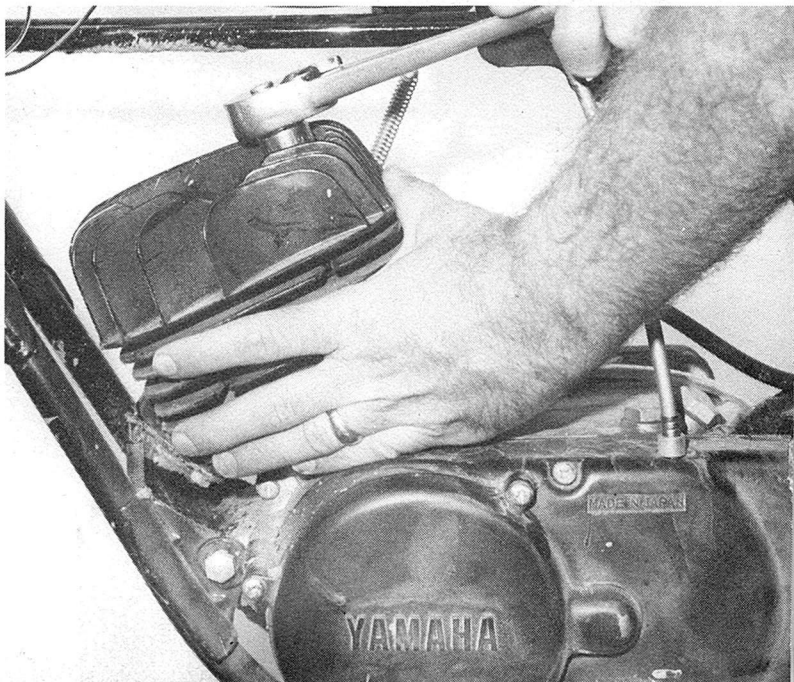


1. The first step in the operation is to remove the gas line from the petcock and lift the gas tank from the frame.



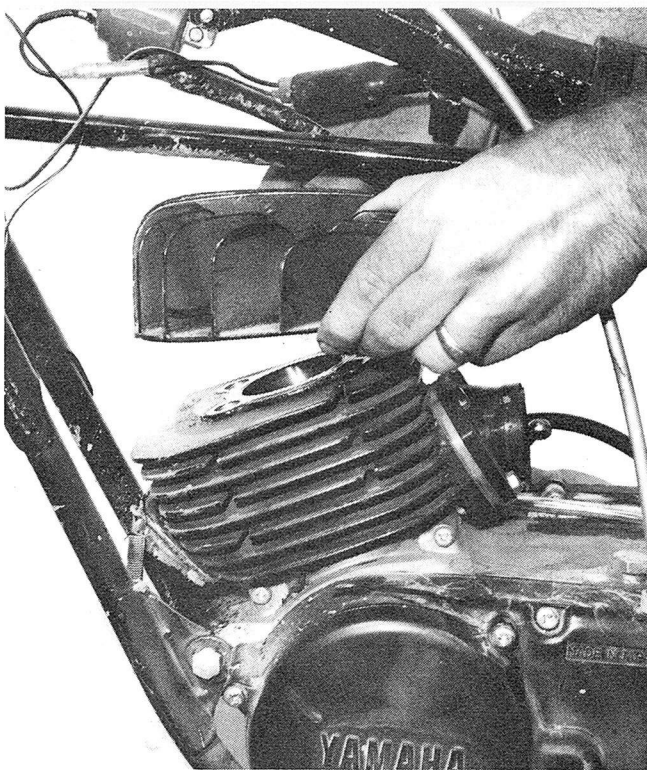
2. Next, undo the securing bolts and retaining spring and remove the exhaust system.

3. Loosen the hose retaining clamps from the carburetor and move the air cleaner out of the way.



4. Next, the carburetor can be removed and tucked out of the way, without taking off the throttle cable.

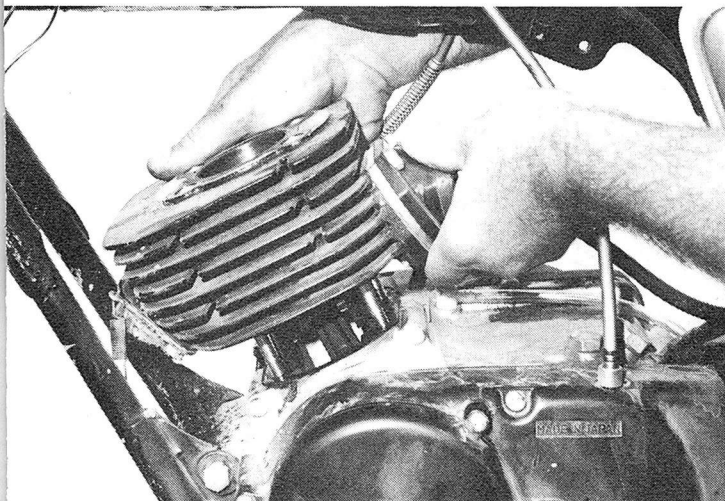
5. You're now ready to loosen and remove the cylinder head bolts.



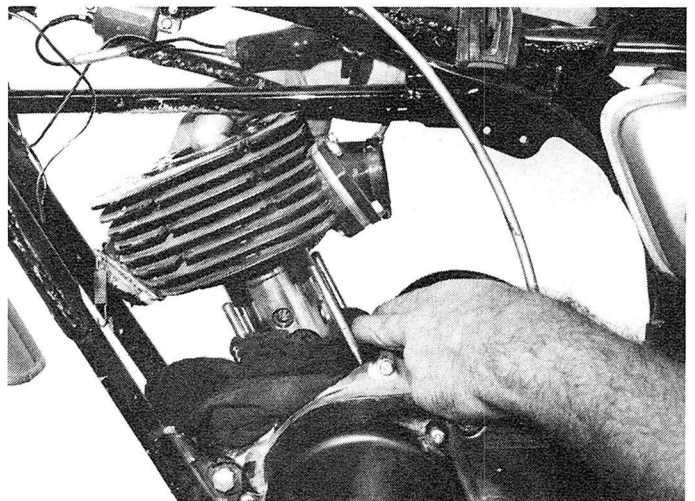
6. With the bolts removed, lift the cylinder head off and set it aside.



7. Before the cylinder can be removed, the Autolube oil line must be unhooked from the right side of the engine.

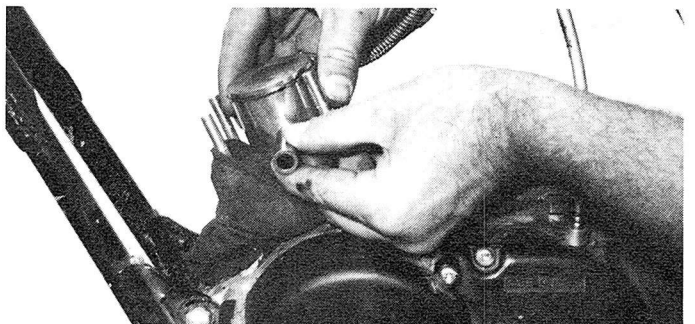
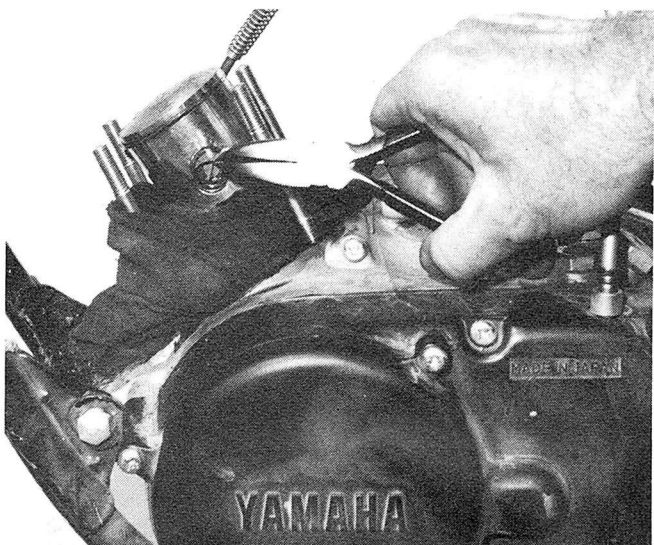


8. Now slide the cylinder carefully up from the engine case, but don't remove it completely yet.



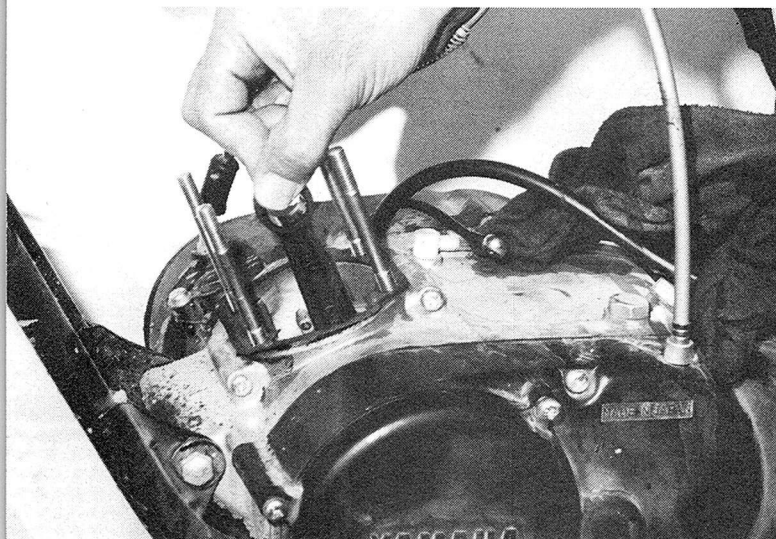
9. Use a clean rag to fill the cavity in the engine case, which keeps carbon and other debris from getting into the lower end when the cylinder is lifted off.

10. Next remove the wire spring clips from both ends of the piston pin.

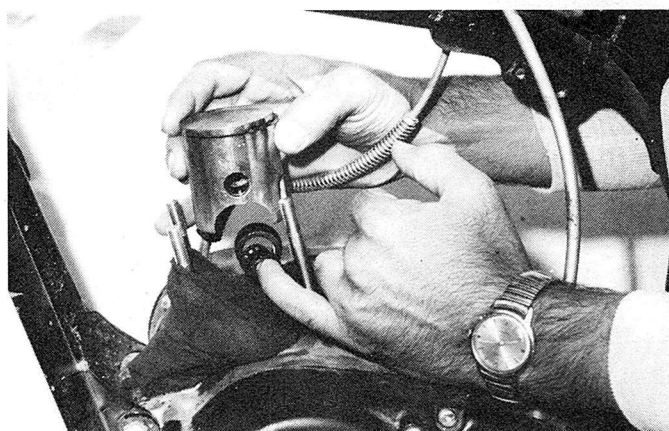


11. With the clips removed, gently tap the pin out one side of the piston.

TWO STROKE TOP-END MAINTENANCE



13. Move the connecting rod from side to side in order to detect excessive play or other signs of bottom end wear.



12. As you remove the piston, slide the caged needle bearing assembly out from the end of the connecting rod.



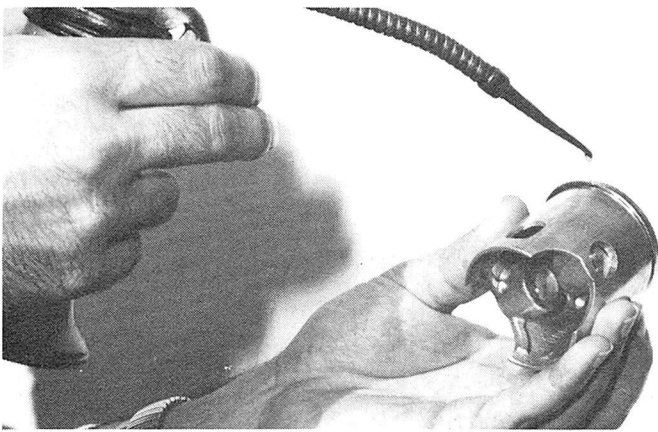
14. Use a fine grit sandpaper to remove carbon from the crown and sides of the piston. Check the ring groove and be sure that the ring is free.



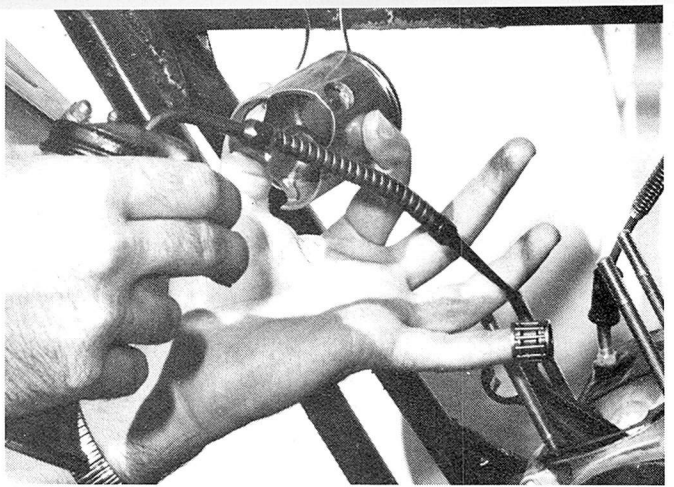
15. Using a knife blade, scrape the heavy carbon deposits from the inside of the exhaust passage.



16. Also scrape the combustion chamber to remove deposits. Finish the job with fine grit sandpaper.



17. Before reinstalling the piston put a coating of motor oil on the ring and in the groove.



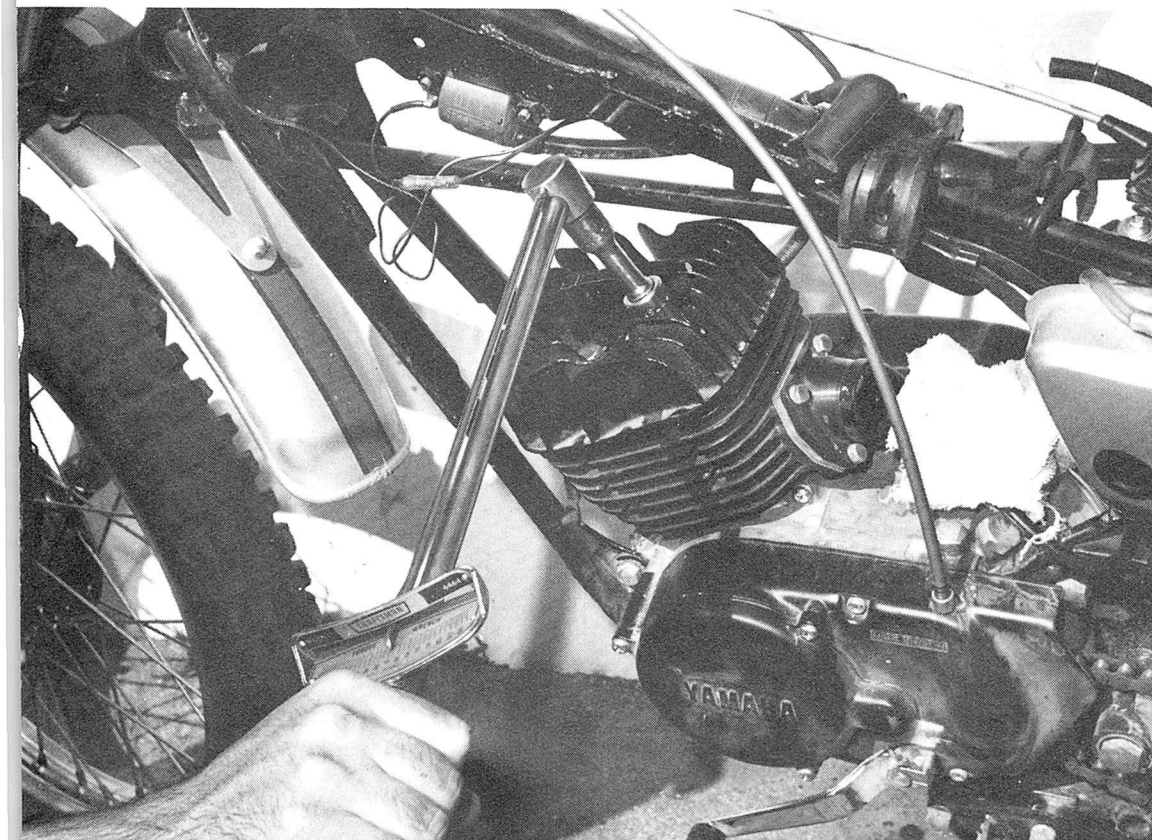
18. Also put a coat of oil on the needle bearing assembly before installing the piston.



19. Note that the top of the piston should have an arrow to indicate the front of the piston.



20. After the piston and pin are reinstalled, put new spring clips on each end of the pin.



21. After the head and cylinder are put into place use a torque wrench to correctly tighten head.

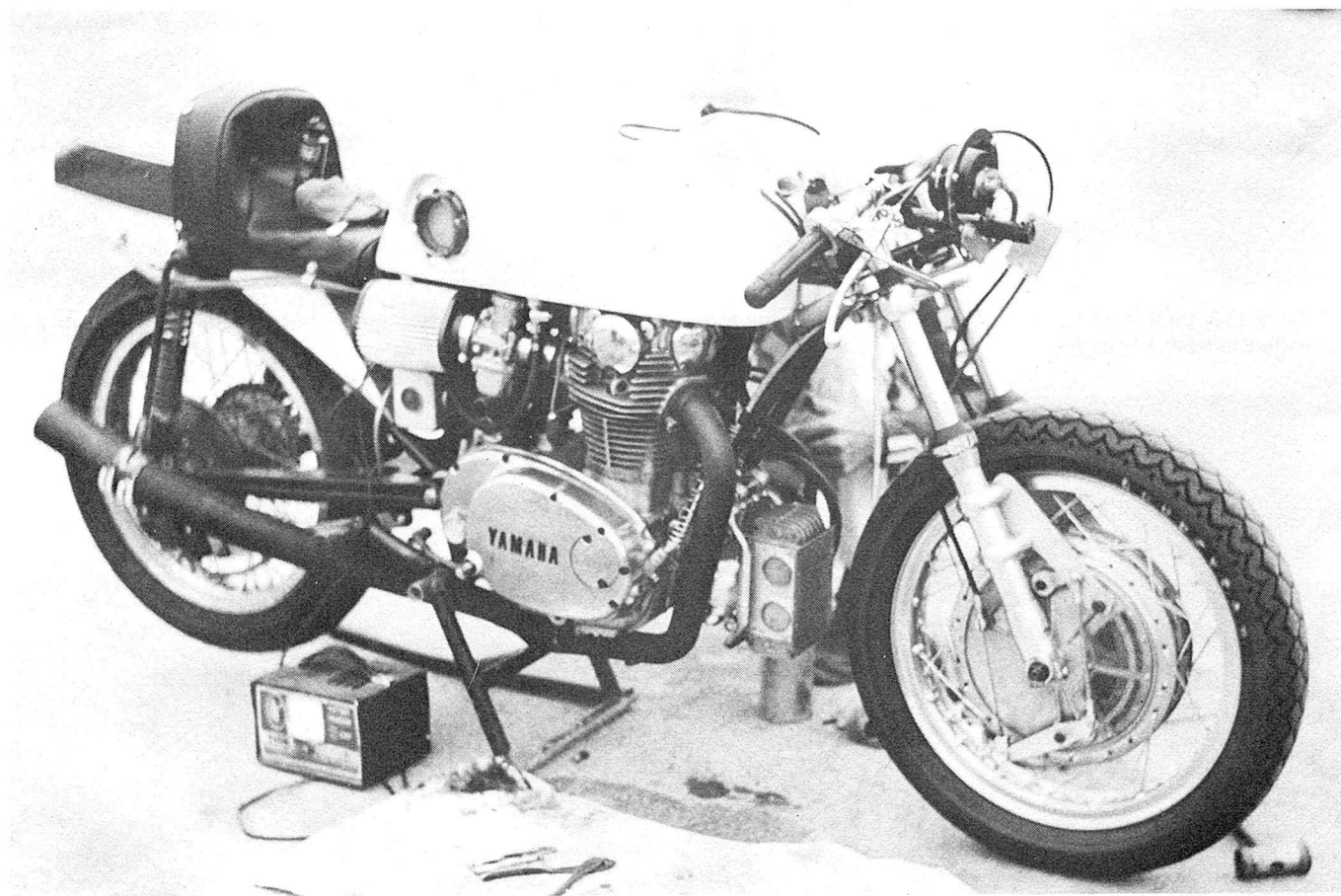
**YOU CAN
FIT FLAT
TRACK
PROVEN
PERFORMANCE
TO YOUR
STREET XL.**

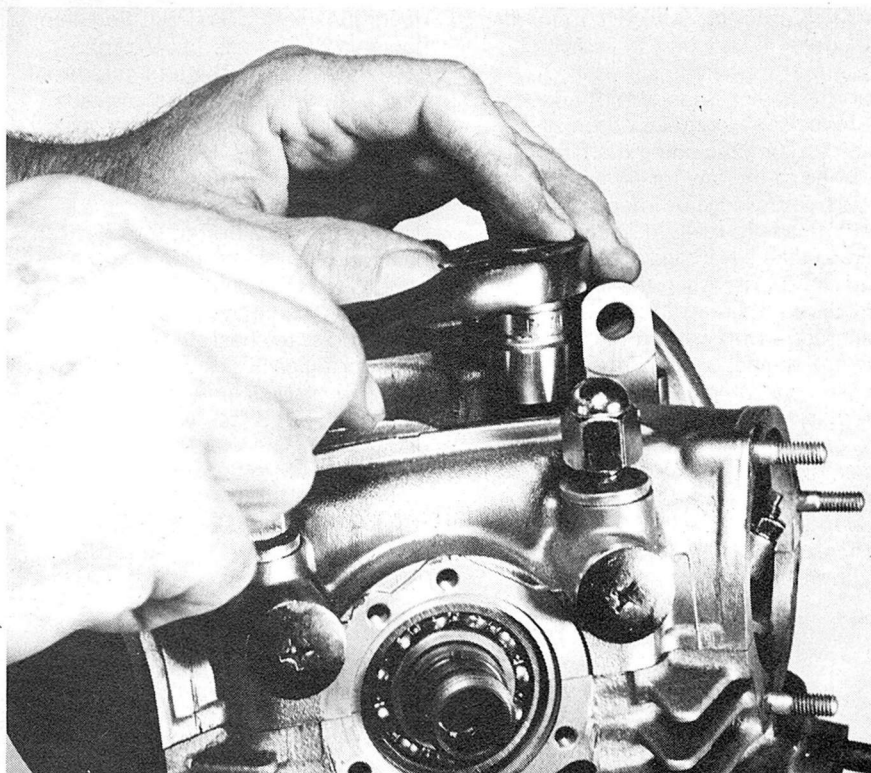
Ever feel like you bought a cake without the icing or a leather couch only to find it was only vinyl? Many XL-650 buyers have had that kind of feeling. The big-bore Yamaha's specifications read like a road racer's or, pardon please, the biggest Honda twin ever made. Others view the Japanese twin as an example of what the British might have done to the Triumph or BSA if they'd been designed in 1960 instead of 1930. If you expect the performance of one-and-a-half Honda 450s or the prestige and muscle image of a British twin from your Yamaha you're going to be disappointed. Most of the aggravation with the Yamaha comes in the area of power and related performance. For all it's paper glamor, this 650 is no faster than the much smaller Honda 450 and the antique English "irons." With nearly half again the displace-

ment of a Honda twin and the exotica of overhead cam valve control, as compared to the big British twins' pushrods, the XL has everything going for it but the action. There's a reason, of course, and that's because Yamaha wanted a twin that would be an equal mix of reliability and performance. It's got it all over the other two twins in that department. If you're willing to settle for the frequency of valve jobs and other mechanical maintenance that the path to more power provides, then your Yamaha might be a likely candidate for one of Sifton Motorcycle Products' camshaft kits.

The Sifton firm was originally established by the legendary tuner of flat track racing Harley-Davidson's, Tom Sifton. He has since retired to leave his love in the hands of his proteges. But obviously, his tuning experience is part and parcel of any of

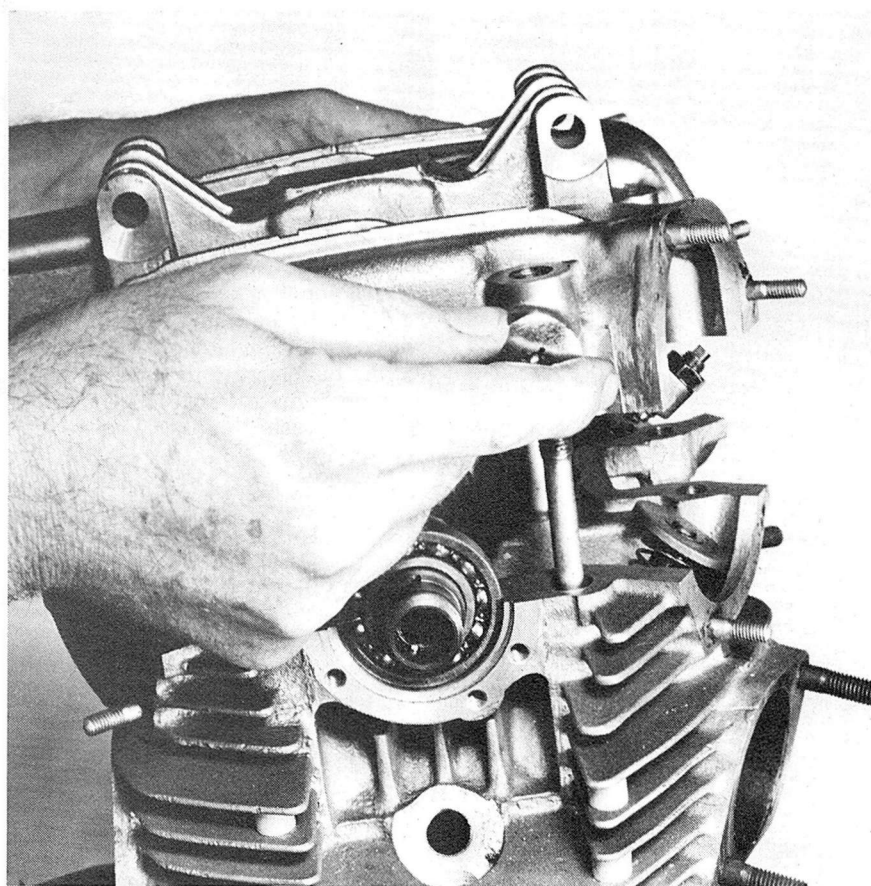
650 SUPER POWER



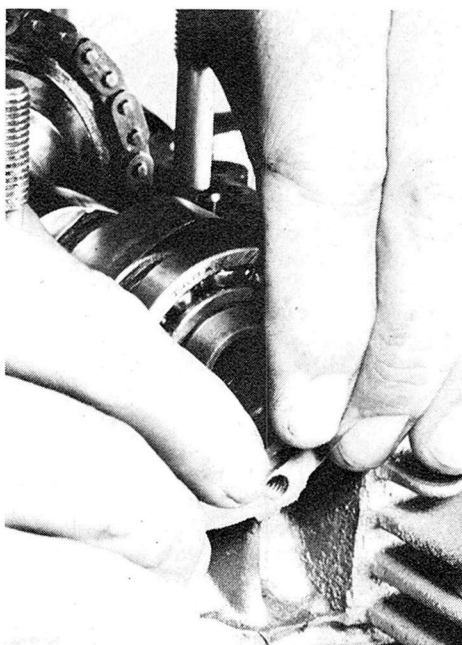
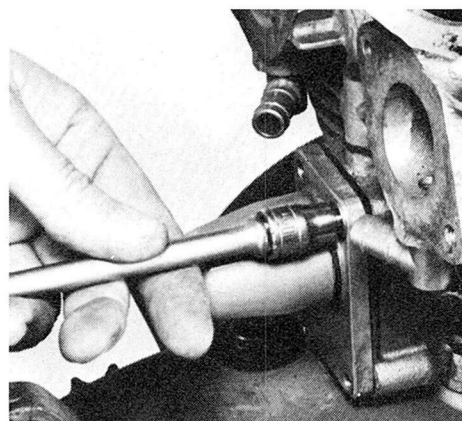


One of your "basic" tools for work on any engine is a factory workshop manual. Your dealer can order one for the Yamaha XL-650 for less than \$10. Follow its steps to remove the engine from the frame. The carbs, intake manifolds, and cables can stay on the frame. Loosen the head bolts.

Remove the four bolts that hold the cam chain tensioner to the rear of the cylinders and slide the complete tensioner out of the barrel. The outside of the engine should be washed and dried completely so no grit can work its way into the engine's internals.



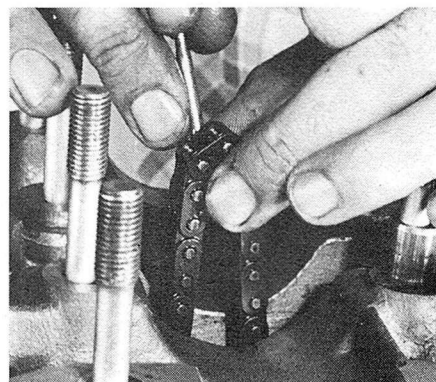
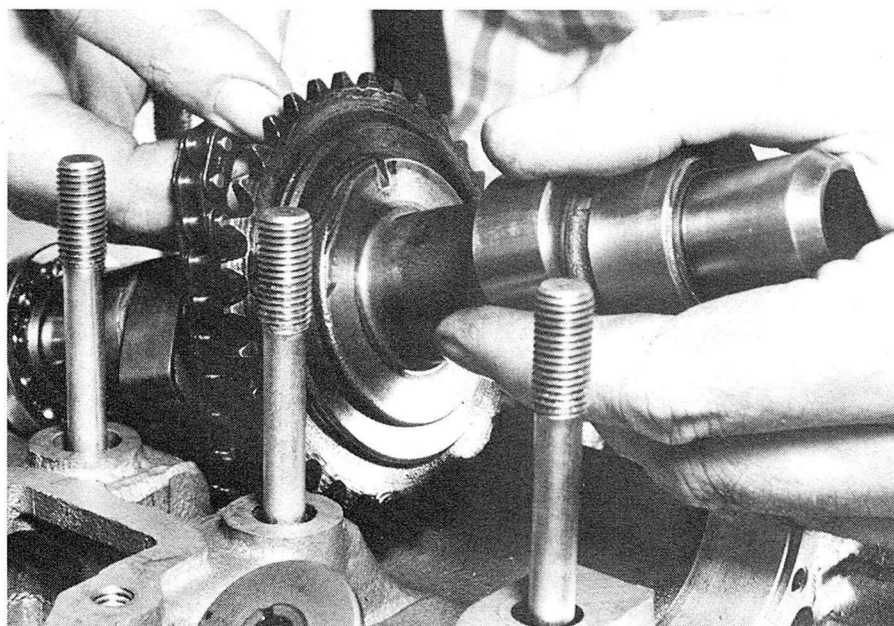
Work the head bolts free, a quarter-turn at a time in the criss-cross sequence shown in the owners manual. The valve cover can then be lifted away from the top of the cylinder head. Be sure both of the end caps and ignition system are removed from the ends of the cam.



Gently pry the two camshaft ball bearings free from their slots in the cylinder head. A few light taps with a rubber hammer may help free them. The complete cam and drive gear unit can then be lifted up so the endless timing chain can be lifted off the sprocket.

the Sifton camshaft or valve train kits. Tom does, in fact, still serve as a consultant to the company which bears his name. Nobody, but nobody could make a Harley-Davidson as quick as Tom, including the factory! He's one of the few tuners with enough knowledge or interest in the 650 Yamaha to really develop its valve train to take advantage of the overhead camshafts. When the Yamaha was introduced, there were several flat track racers who wanted to use the Yamaha engine. So the Sifton works developed a complete new valve train, based on the stock-fit parts, with the data gathered from their own dynamometer. You can buy the Sifton camshaft, keeper, and valve spring kit for a full-on flat track 750 complete with instructions that even specify the length of the exhaust pipes. Street

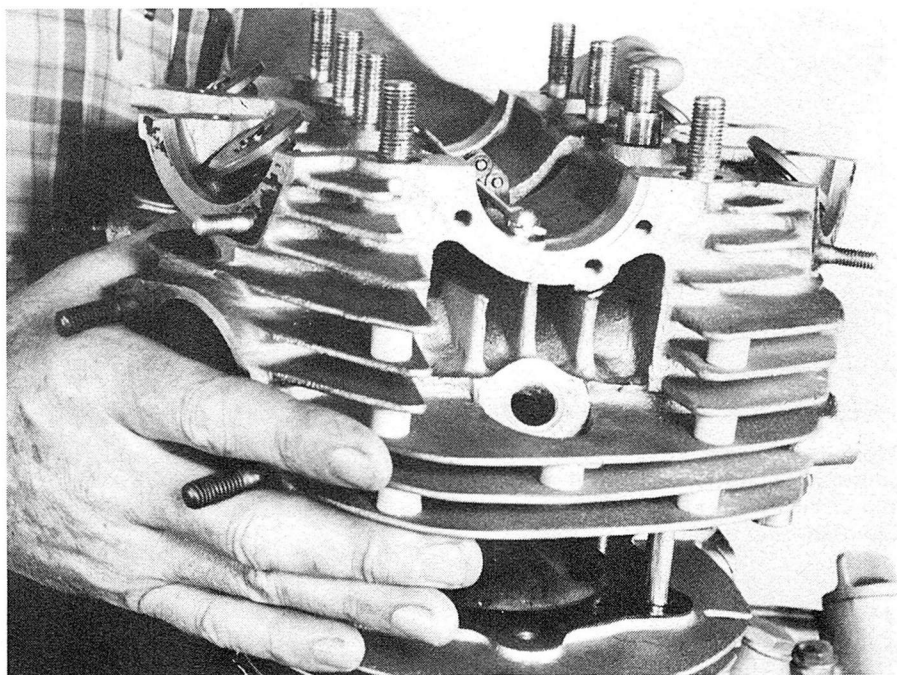
riders (or street racers) will find ample power in the standard 650 cam/keeper/spring kit. There's a reason, of course, why the Sifton people can often extract more power than even the factory tuners. That reason is thoroughness and it applies to their cam kits for street use, too. This is definitely NOT a bolt-in setup. It can be done in a home shop, but you'll have to track down a friendly machine shop to machine the kit's spring collars with a press to check the height of the valve spring pack as assembled in the head. The valve stems, too, must be machined, but Sifton will supply those ready-to-fit. The keepers must be individually fitted to your head to match the exact depth of your valve seats. If you want bolt-in power buy someone else's cam kit and settle for less than the best.



Tie a six foot length of common steel baling wire or twine to the timing chain so you won't lose the chain in the depths of the crankcase. You don't have to pull the cylinder barrel, but it's wise to at least inspect the pistons, bores, and rings for wear as per the factory manual.

Gently pry the two camshaft ball bearings free from their slots in the cylinder head. A few light taps with a rubber hammer may help free them. The complete cam and drive gear unit can then be lifted up so the endless timing chain can be lifted off the sprocket.

The cylinder head is now free from the barrel. If it won't lift right off you can temporarily replace both spark plugs. Crank the engine over slowly to let the compression loosen the head gasket's grip. The head can then be lifted off and the spark plugs removed.



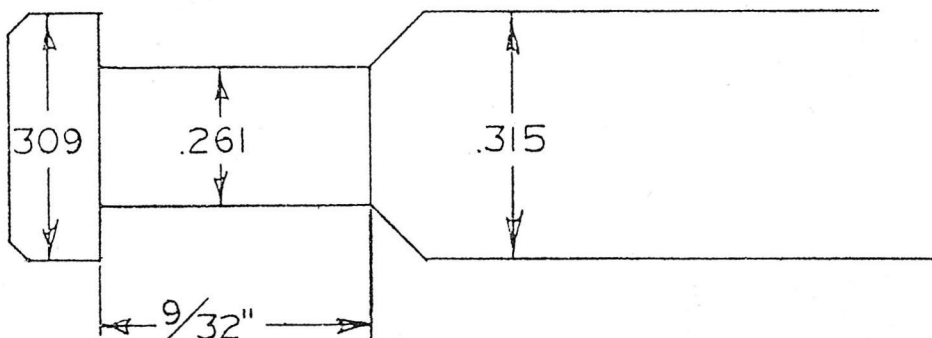
The secret of the Sifton cam's success in developing power lies in the proper matching of the cam's characteristics to the valve springs. The cam, remember, only opens the valves. The valve springs are the primary factors in whether the cam followers really do follow the cam lobes for accurate opening and closing. The complete Sifton Motorcycle Products (943 Bransten Road, Dept. CY, San Carlos, California 94070) kit will leave you little change from \$200. The kit

Use a C clamp style valve spring compressor to compress each valve's springs far enough so the split keepers can be lifted away from the valve stem. Replace any badly burned valves (or better, buy a set of Sifton's modified stock valves), grind and lap each valve seat and valve.

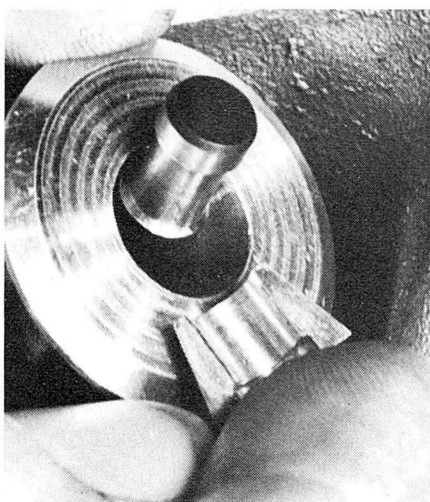
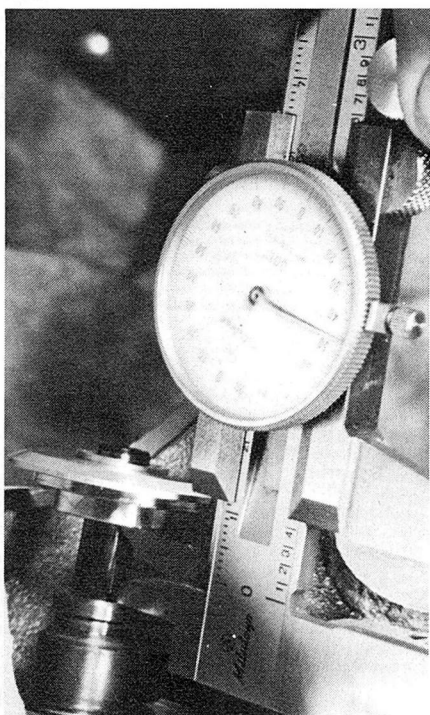
includes the cost of regrinding your cam (they add on a core charge of \$30 until they receive your reusable cam), four upper and four lower alloy collars and valve stem split keepers, matched length inner and outer valve springs, and new intake and exhaust valves with keeper grooves cut to match the Sifton keepers as well as complete instructions. This is one kit in which the instructions are as important as the parts. We watched them install a kit, but be sure to read and follow the instructions furnished with your kit since minor procedure changes do occur from time to time.

The Sifton valve collars are cut so that the inner spring seat is just a bit higher than the outer. This step allows you to set the valve spring's fully-compressed length (where the coils bind, they call it coilbind, naturally

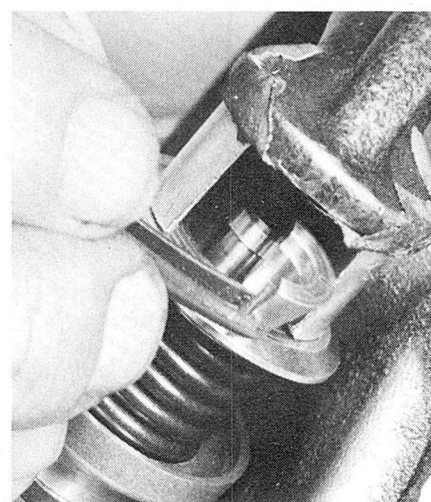
Each of the stock Yamaha valves must be machined at their stem end to the shape and dimensions shown, so Sifton's collars and keepers will fit. Sifton can supply valves with stems already cut or they'll machine your new valves for \$2 per valve.



THIS DWG. IS NOT TO SCALE



The Sifton "package" includes new inner collars, new outer collars, and new split keepers. Assemble just these parts, but not the Sifton inner or outer valve springs (for now) on each valve. The valves must be seated perfectly before any further assembling or checking.

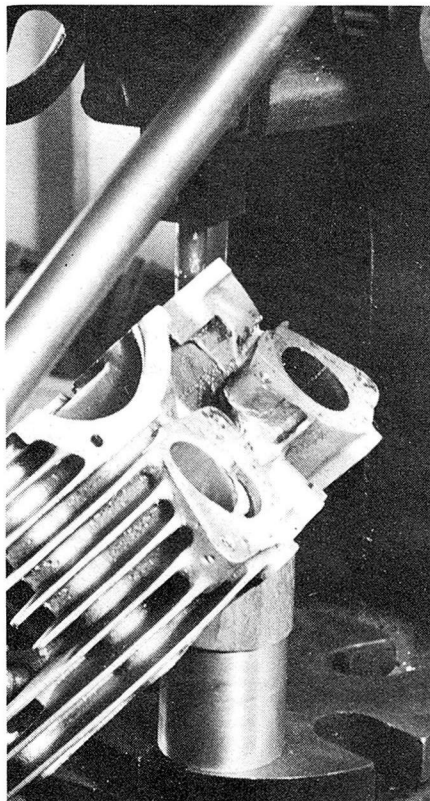


After you've checked each valve for adequate free movement, the outer collar and split keepers can be removed and just the inner springs fitted. Use the C clamp valve spring compressor again to compress the springs so the split keepers can be fitted around the stems.

Use a set of vernier calipers to measure the amount of movement available for each valve before the outer collar will hit the top of the stock valve guide. The dimensions are given in the text. The top of the valve guide will likely have to be ground away.

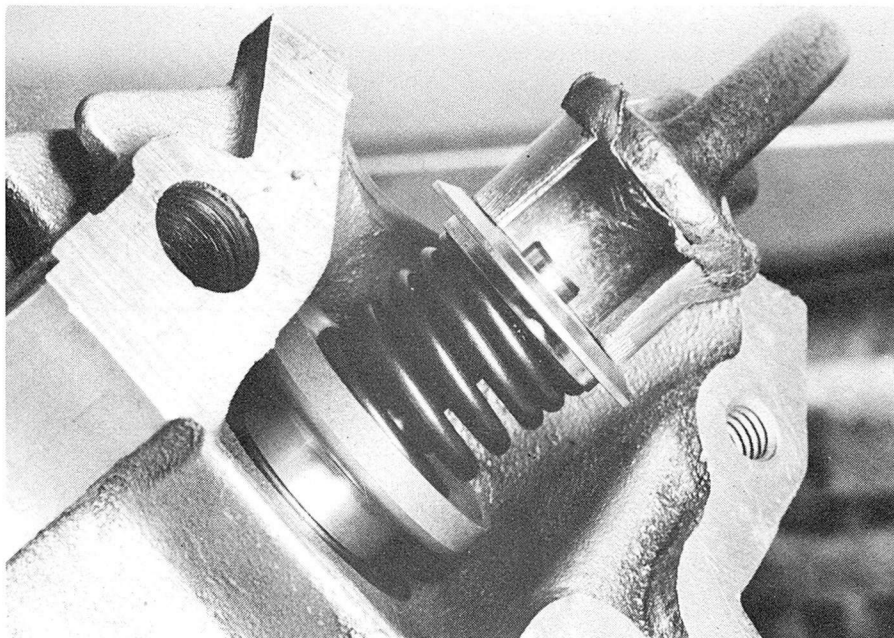
springs. You must then measure the amount of free movement at the valve stem before the valve bottoms out on the stock valve guide. The Sifton 650 cam requires .525-in. of free travel for the intake valve and .500-in. for the exhaust. If the keeper hits the collar with less than this specified free movement the top of the valve guide will have to be machined away on a lathe or a grinder until the valves have that minimum free travel. Next, assemble just the Sifton inner springs with the Sifton valves, inner and outer collars, and split keepers. Place the head in a drill press or just a plain lever operated press to compress the individual valves against their inner springs by pushing

down on the valve stem. You'll receive the coilbind specifications for the springs in your kit. Most of the Sifton 650 inner inlet springs will coilbind between .540 and .545 inches and most inner exhaust springs between .515 and .520 inches. Place a dial indicator in the valve or the arbor of the drill press to get an exact measurement of how far your valves can move before coilbind occurs. You'll find that they won't compress quite as far as they should. Note the reading for each valve. Subtract that dimension from the Sifton-specified coilbind length to determine how much material must be machined (on a lathe) from the bottom surface of the

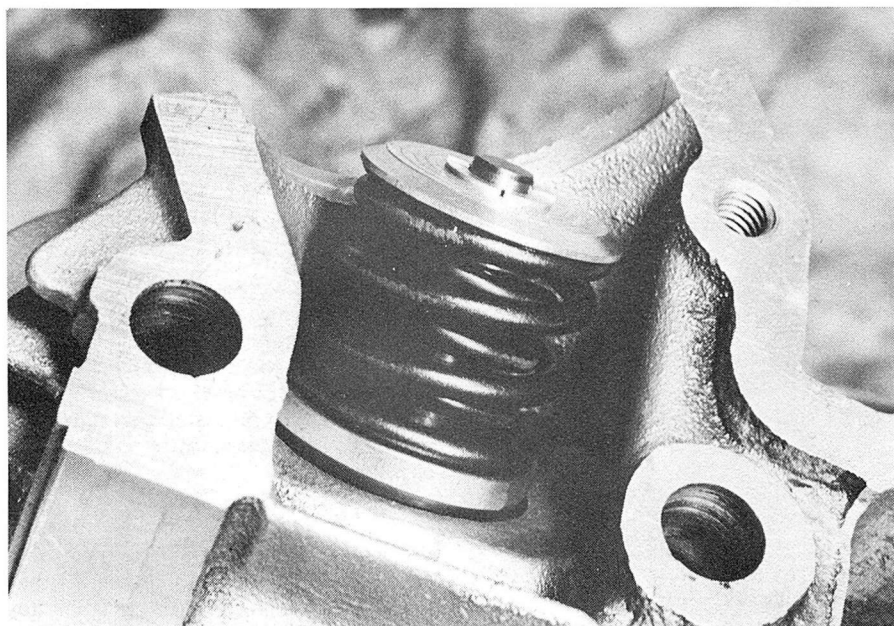


Place the cylinder with the Sifton parts installed in an arbor press (shown) or drill press. A bit of bar stock will hold the valve face against its seat, while you compress the springs with the press handle. A dial indicator (top left) is used to measure the compression.

Nearly an eighth-inch of this inner collar had to be machined away to obtain the correct (as specified in the Sifton's cam instructions) amount of valve spring travel. Check each valve's inner spring; then complete the valve spring work by adding the outer valve springs.

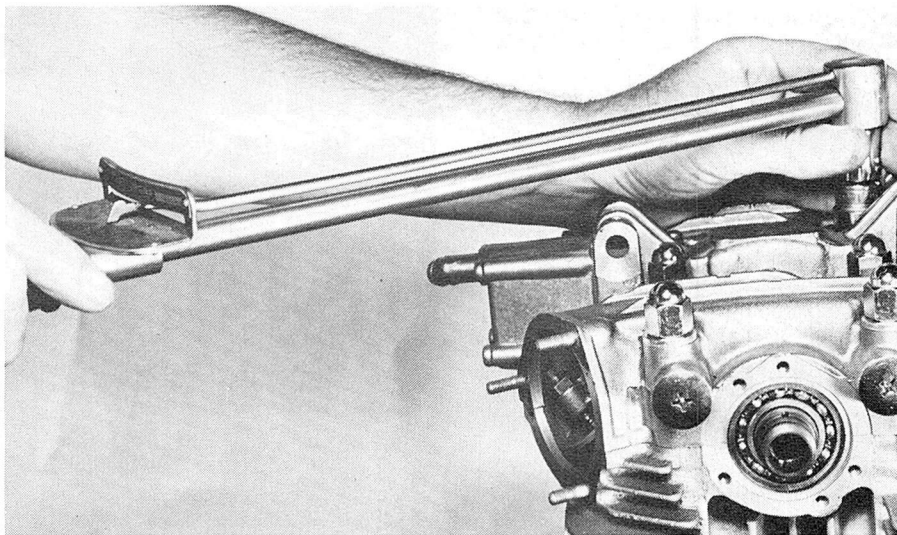
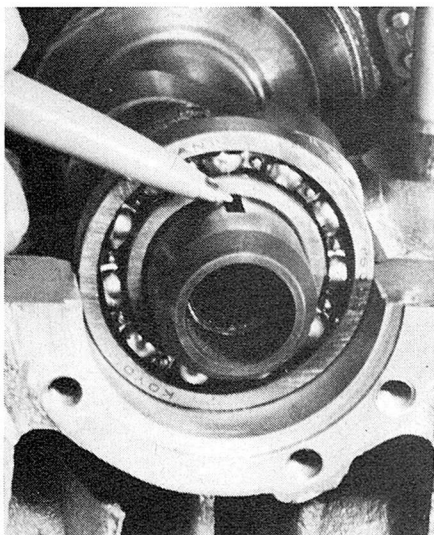


The inner valve collar (shown here with a C clamp valve spring compressor in place) has an extended inner face just next to the cylinder head. The cylinder head side of this inner collar will have to be machined, as outlined in the text, so the valve springs can be compressed far enough.



Sifton inner collar. If, for example, you find that your left exhaust spring coilbinds at .340 inches (when test assembled and fully compressed in the drill press) you'd subtract that from the .515-in. figure to find that .165 inches (.515 minus .340) must be machined from that one valve's inner collar. Measure each valve and machine each inner collar to the amount you measure on your own cylinder head, then reassemble each and double check to be sure each inner spring will compress at least as far as the specified coilbind lengths. The outer valve springs can then be added to each valve and the head reassembled onto

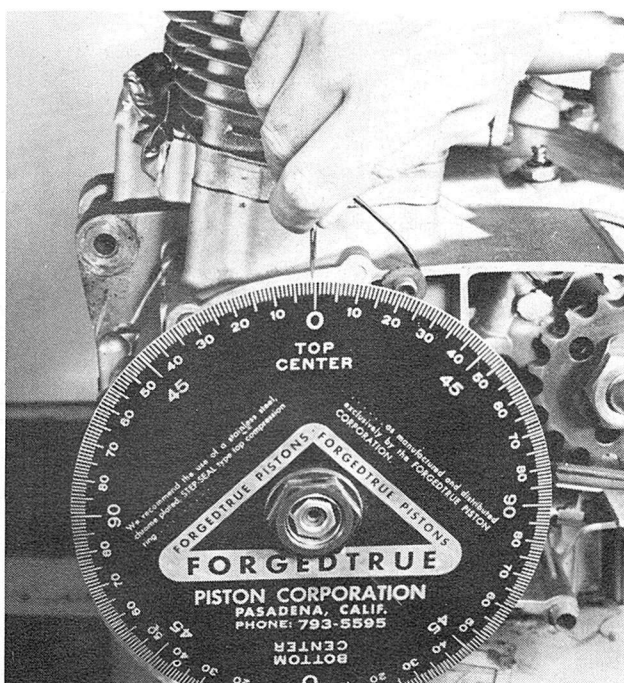
the engine. The cam timing must be checked with a degree wheel and adjusted, if necessary, so the valves are opening as specified by the instructions furnished with your Sifton cam. Verify the ignition timing to be precisely as recommended in your XL owners manual. The carburetors must, of course, be in perfect synchronization and it's likely that you'll need larger main jets with a bit of fiddling with needle positions to finish off a perfect tune. Now you can wave goodbye to those pesky Honda 450s and Triumph twins and go looking for some Nortons and Honda fours.



Replace the cylinder head. Rotate the crankshaft so the top dead center marks line up with their mates on the crankcase. Insert the cam, then with its notch pointed straight up as shown for correct cam timing. Slack off on the valve adjusters and replace the valve cover.



Carefully rotate the engine to check the cam's action. If all is well, each valve can be adjusted, as indicated in the manual, for clearance between the valve stem and the rocker arm tips. Leave the valve adjusting caps off the valve cover to check the cam timing.



Replace the timing chain and bolt down the spring tensioner to the back side of the cylinder barrel. Torque the cylinder head bolts down in the pattern and to the torque settings indicated in the factory manual. Tighten each a few turns at a time for the last few turns.

Bolt a degree wheel to the end of the crankshaft, with a wire pointer to indicate zero, when the crankshaft top dead center timing marks are perfectly in line. Rotate the engine to the exact inlet and exhaust valve opening figures included with your Sifton reground cam to be absolutely certain the valves are operating within Sifton's tolerances.

Dirt riding can dish out a lot of punishment to a motorcycle. What with jolts and falls, dirt, dust, mud and water, the average dirt machine takes more punishment in a day of riding than a street bike gets in months of it. Not only is dirt riding hard on equipment, but it demands equipment that performs well and stays together.

For all of these reasons, a regular maintenance and servicing schedule is as important for a dirt bike as it is for any other machine around. Before you take it out, a checkup of your bike should be made. It should also receive a careful and complete going over after four to six days in the dirt.

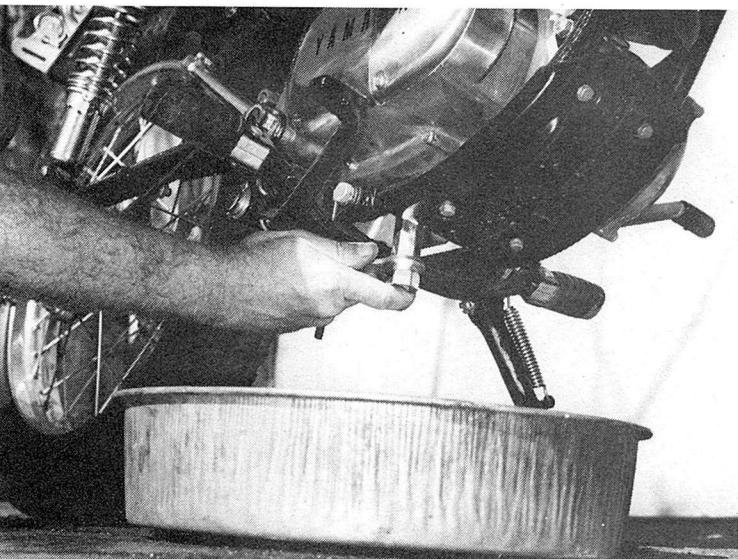
The bike should be cleaned, lubed, the oil changed, the controls adjusted, the chain lubed and adjusted, and all of the other similar details attended to. A careful inspection of all of the components is also in order during these regular maintenance programs.

Make a list of all the items to be done at this time and try to follow a more or less organized plan of attack. Carrying out an organized plan, rather than randomly poking around checking this and tightening that, will help insure a successful operation.

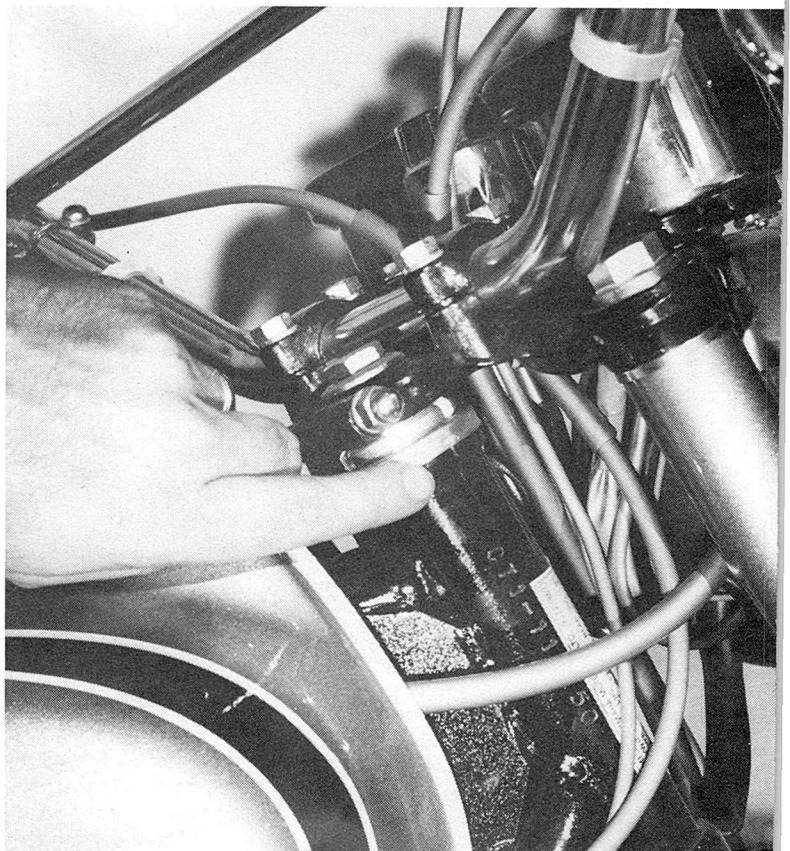
Always start by cleaning off the machine. This makes the work easier and also allows you to detect any problems that may be developing. If you are careful with your work, going through the process regularly, it should add reliability and longer component life to your machine.

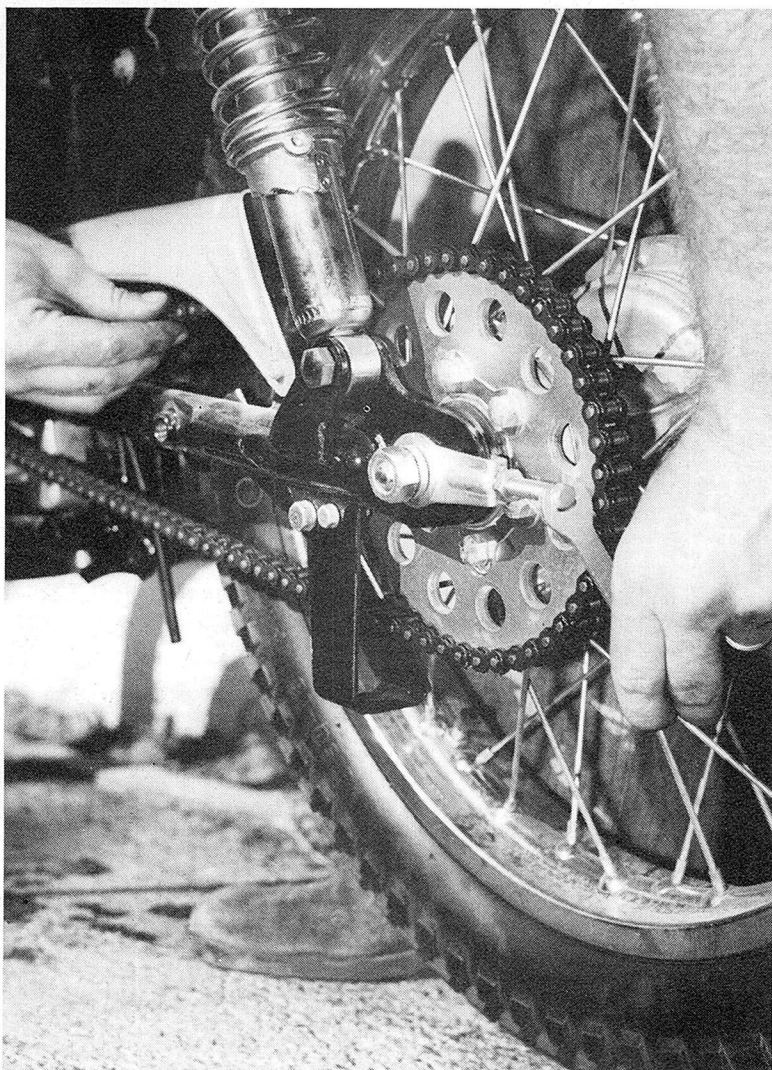
DIRTING MAKES SPECIAL DEMANDS ON A MOTORCYCLE. A REGULAR SCHEDULE OF MAINTENANCE AND SERVICE WILL HELP YOUR MACHINE STAND UP TO IT.

The Dirt Rider's Maintenance Guide



1. Start the job by draining the oil. Use a clean pan. Examine the condition of the oil after it has been completely drained.
2. Check the steering head bearings for looseness, which could indicate wear to the bearings or simply the need for an adjustment.



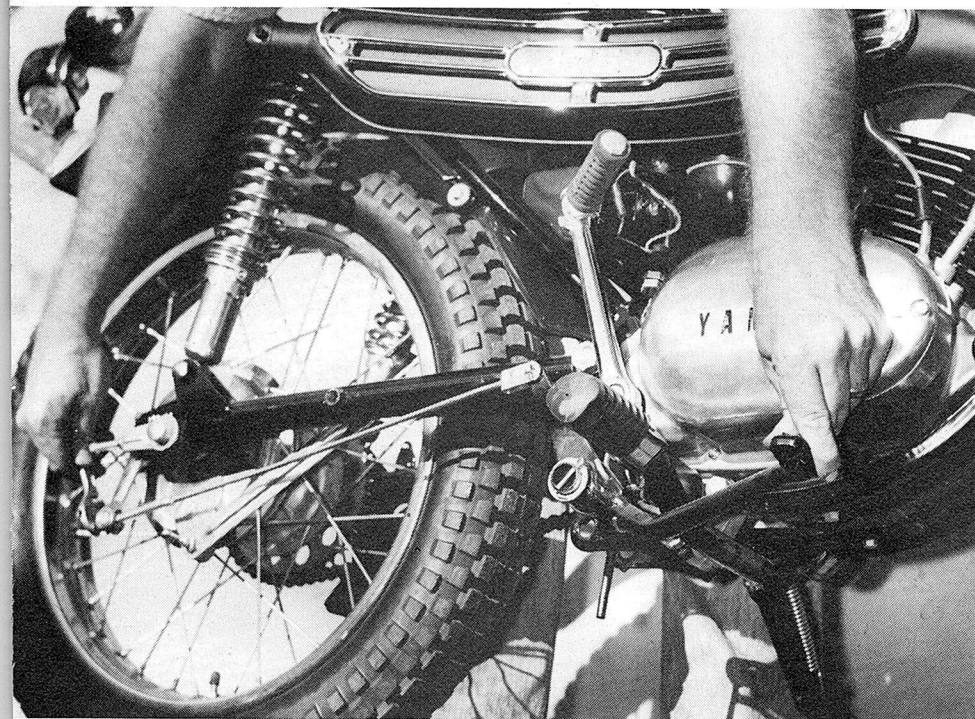
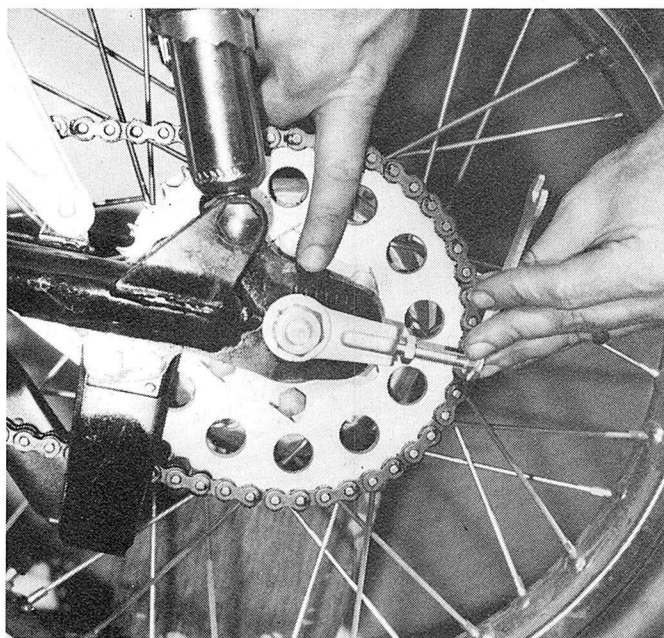


3.

3. Check and adjust the chain. Examine the condition of the sprocket teeth as well.

4. After the chain tension is adjusted, be sure to line up the axle so that the wheel is running straight in the chassis.

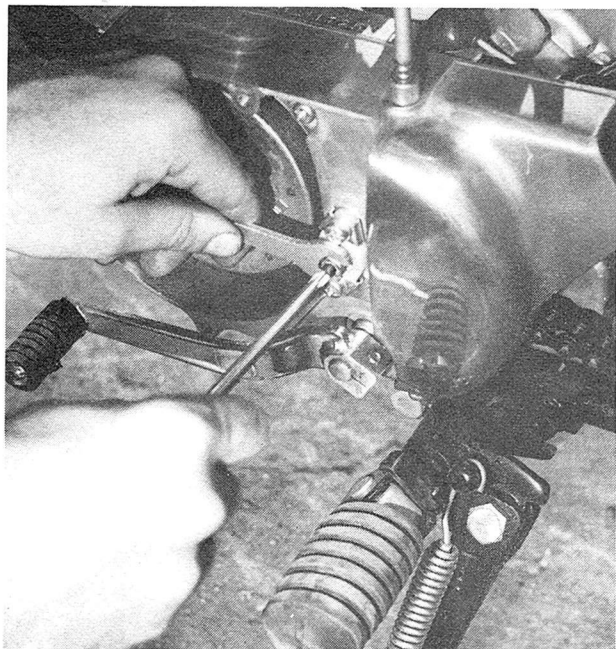
4.



5. Be sure that you make the rear brake adjustment after you have adjusted the chain, since moving the rear axle will change the adjustment of the rear brakes.



6. The front brake should also be adjusted at this time.

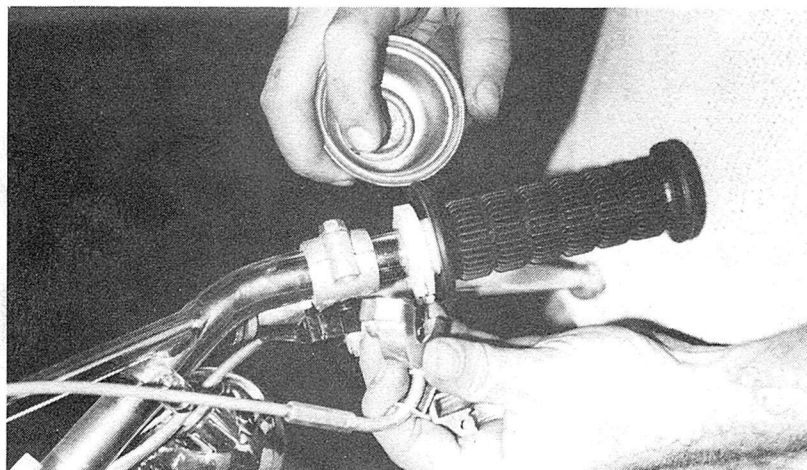


8

8. After the clutch has been adjusted at the engine, don't forget to re-adjust the clutch lever.

7.

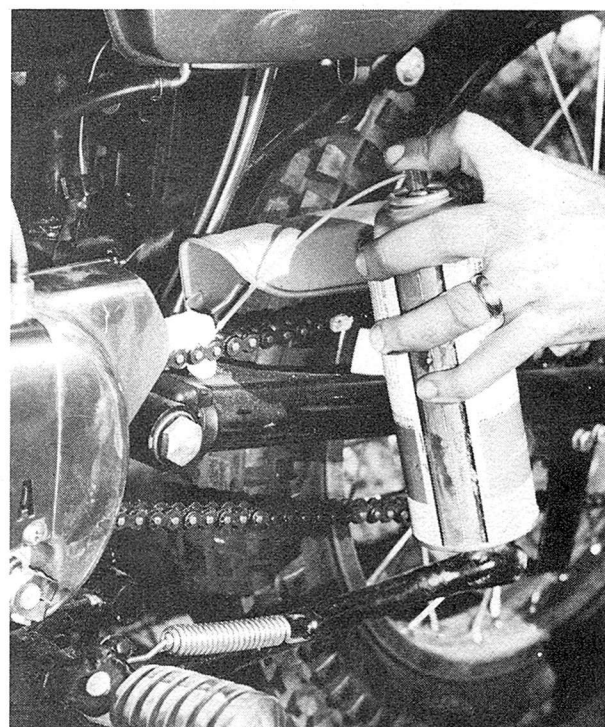
7. Adjust the clutch at the engine by backing off the lock nut, turning the adjuster screw in until it bottoms, and then backing it out 1/2 turn.



9.

9. Silicon, sprayed inside the throttle grip, will help the mechanism working smoothly until the next servicing.

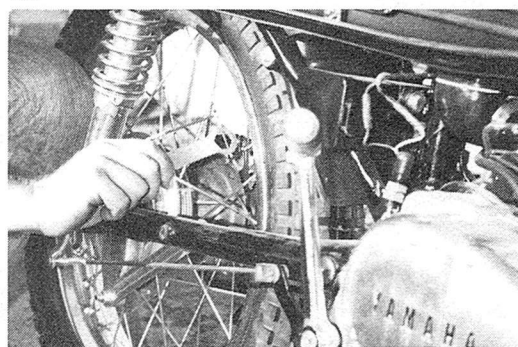
10. Lubricate the entire length of the chain with a good non-oily chain lubricant.



10.

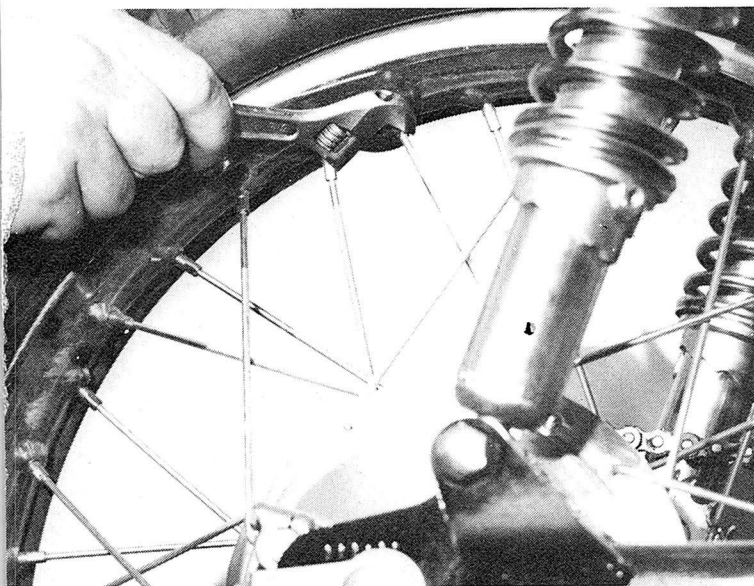
11. Examine the fork seals and dust covers to be sure that the forks are not leaking and that no water or dirt has found its way in.

11.



12. Test for loose spokes by tapping each lightly with a small wrench. Loose spokes will have a dull sound compared to the ring of the tight ones.

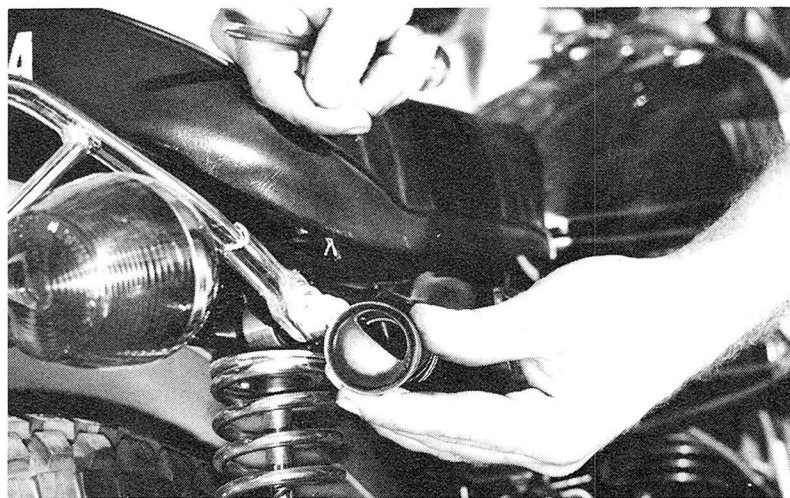
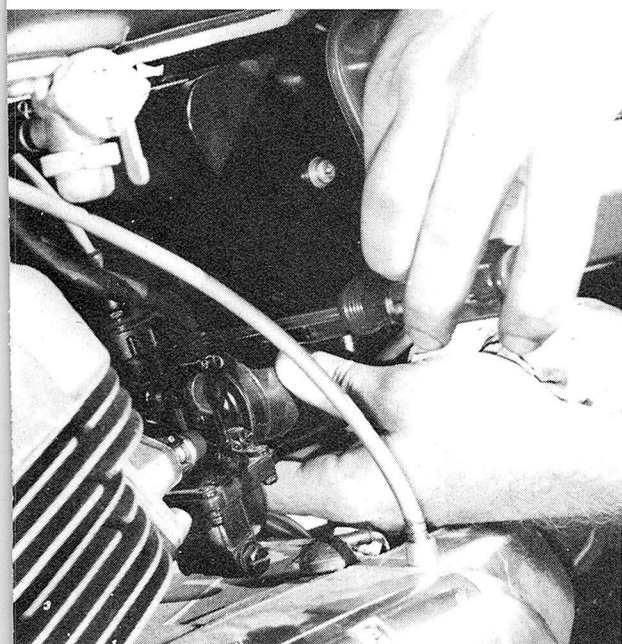
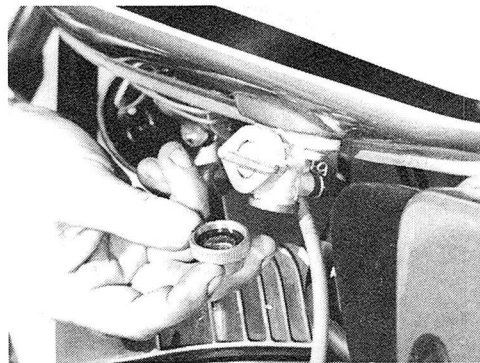
13.



13. Tighten any loose spokes that you may find, but be careful not to overtighten them.

14. Remove the sediment bowl from the bottom of the gas tank petcock and clean out the bowl of accumulated particles.

14.



16. If your bike is equipped with a muffler or spark arrestor, remove the insides and clean them out with a wire brush.

15. Check the rubber hose clamps which connect the carburetor to the air filter; if they are loose, dirt can get in and damage the engine.

15.



17.

17. Use gasket adhesive to be sure that gaskets around ignition parts and other important areas are water tight.

preparing your motocrosser for battle

**RELIABILITY IS NO ACCIDENT.
EVEN A GOOD MACHINE NEEDS A LITTLE
HELP BY WAY OF CAREFUL
PREPARATION AND MAINTENANCE.**

In order to wage a successful motocross campaign, often the things you do off of the track are almost as important as the things you do on it. It may be a well used phrase that you can't win a race you don't finish, but it is very true. Having a reliable mount goes much deeper than simply changing the spark plugs once in a while. It actually starts when the machine is new, before it ever sees the heat of competition.

The preparation and maintenance tips that we will review in this section fall basically into three divisions: 1) initial preparation and setup; 2) between race maintenance; and 3) at the track tuning.

Before starting any kind of a maintenance procedure, get organized. Make a complete list of all the individual things that you plan to check or do. After each item is taken care of completely, check it off your list. This way nothing will be neglected or forgotten. Lay out a plan of attack for each operation and follow it.

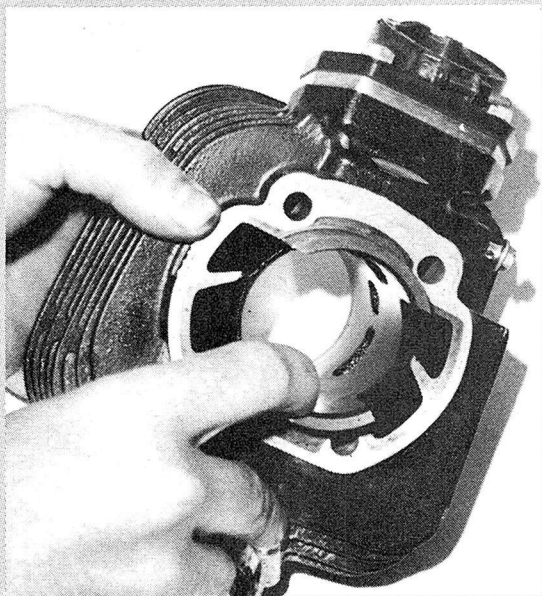
The first area that we will cover will be the initial preparation and setup of a new machine. This is a much neglected area, but will yield good results for your efforts. Don't pass it off as a waste of time or assume that if the machine is new it must be ok. Even the factory racers get the once-over by the mechanic before they're put on the track in competition.

initial preparation and set-up

A brand new motocross machine may be bright, shiny, and come from a good line, but that doesn't mean you should assume that it is perfect or even ready to race. A new machine should be broken in under controlled conditions. Then, the top end should be pulled apart and checked to be sure that everything is wearing correctly. Also at this time you should make any changes that are necessary in order to tailor the machine to you. Even the simple act of repositioning the handlebars can make the bike more comfortable and increase your endurance in competition.

A new machine should be broken in before it is raced. Yamaha recommends running the machine for ten miles at below half throttle, before you really open it up. After the break in, pull the top end components and inspect for scratches, high spots, and other potential problems.





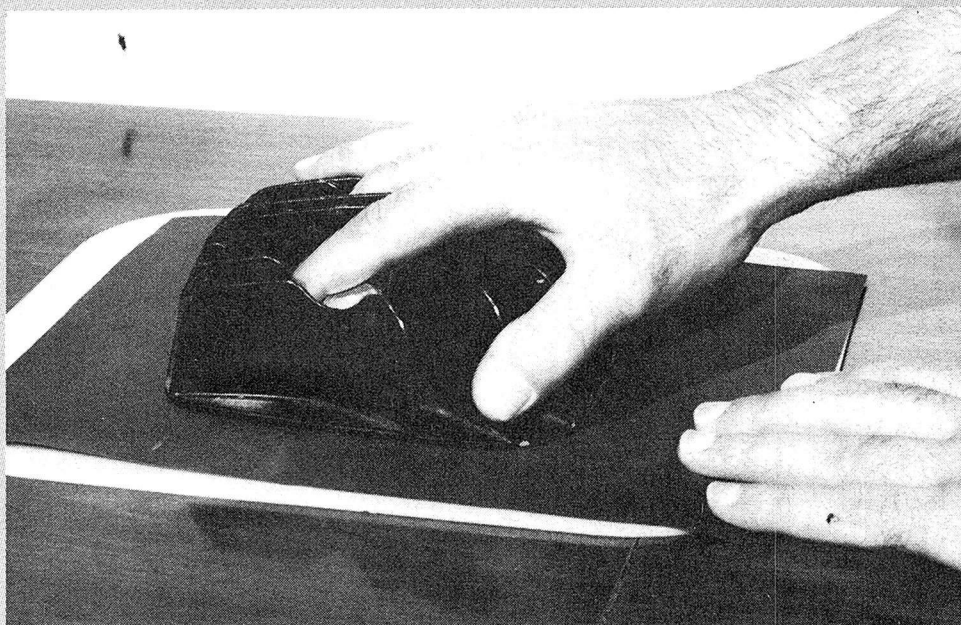
Examine the cylinder for scratches and check the ports for alignment and rough edges. Careful attention at this stage will insure good ring seal and long engine life.



Use 600 grit sandpaper to smooth out scratches or high spots on the skirt of the piston.

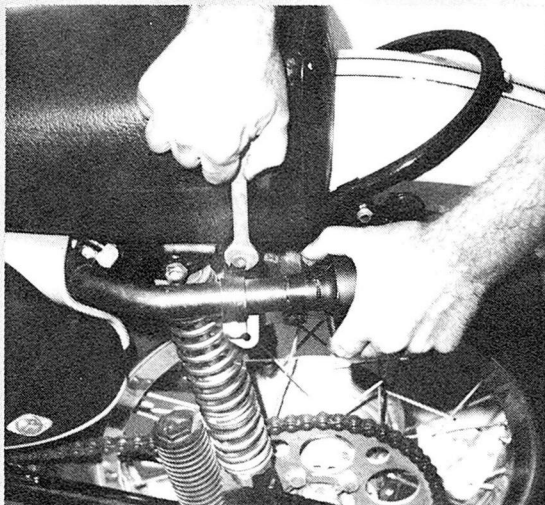
A sheet of 600 grit sandpaper on a sheet of good glass can be used to prepare the gasket surface of the head. Move the head in a figure eight motion. Keep the pressure light and check your progress at short intervals.

Tailor the machine to fit you. Reposition the handlebars, levers, or even modify the footpegs if necessary to get a comfortable fit. You can't ride your best race with an aching back.



between race maintenance

Make a tour of the entire machine, tightening bolts and checking for loose components.



The air filter element is located under the seat. Two bolts at the rear of the seat hold it in place.

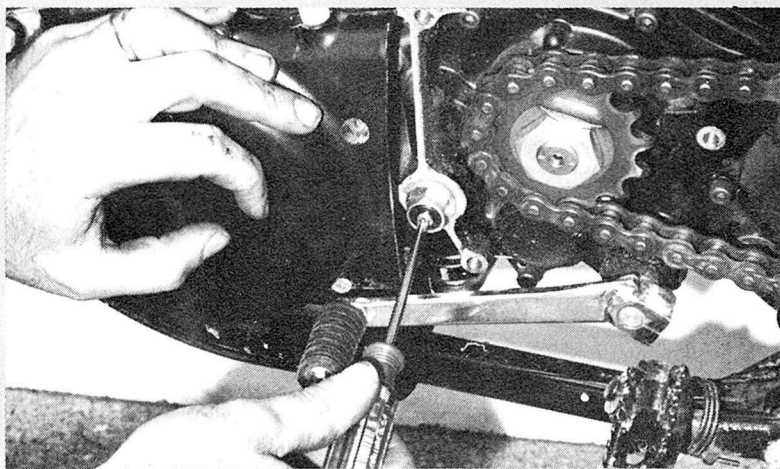


The air filter element should be removed and cleaned after each race. A weekly tuneup won't help much if the filter is clogged and dirty.

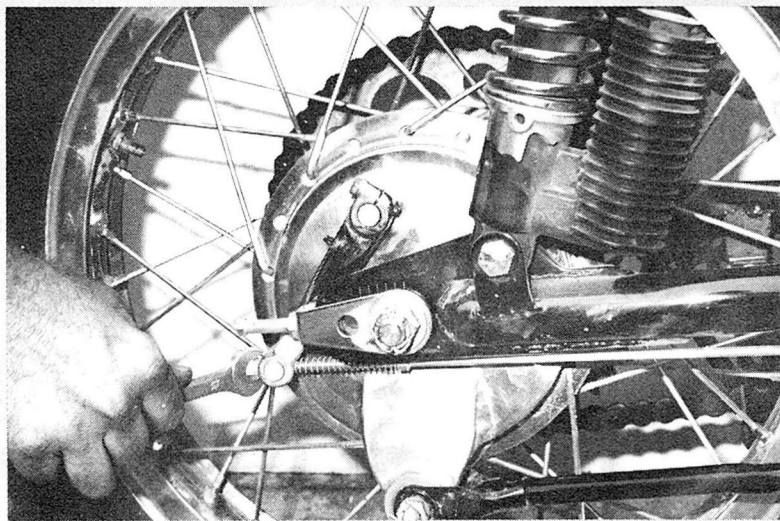


Between race dates, you should have a planned program of regular maintenance, including a complete examination. Before you lift a wrench on your machine, the first step in your weekly procedure should be a complete washing down of your machine. Getting all of the grime that accumulated during the race outing will not only make the maintenance easier to perform, but is essential so that the frame and other major components can be checked for cracks or other potential trouble.

Check the level of the gear oil between races. Drain and replace the oil after every few race days. The price of an oil change is cheap insurance against unnecessary gearbox damage.



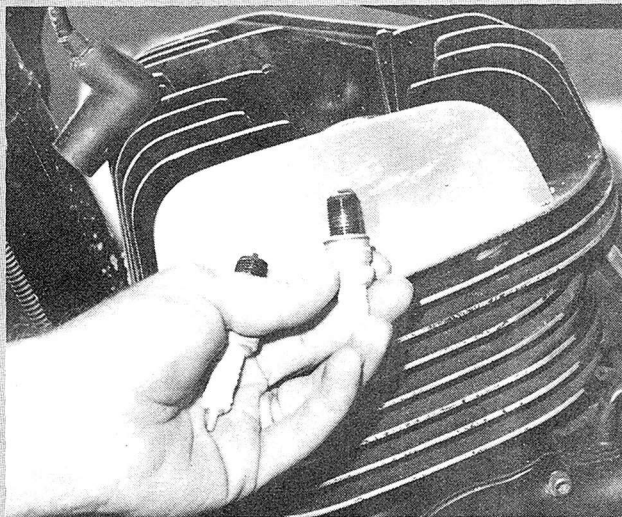
Don't overlook items like a clutch adjustment in your regular routine.



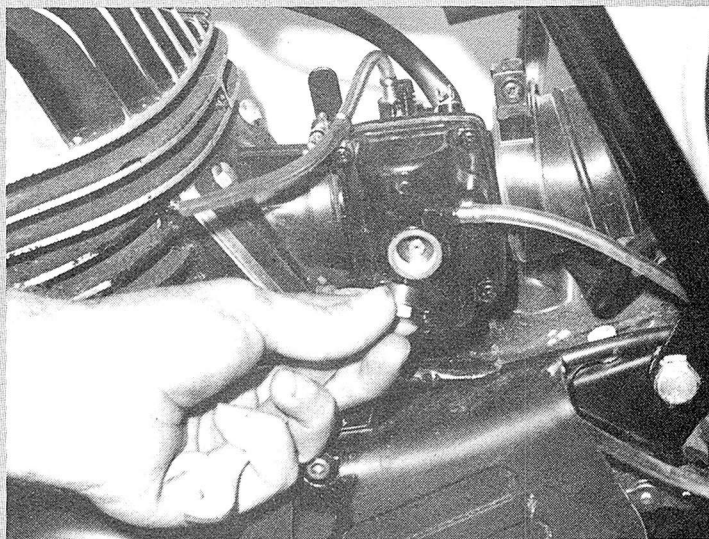
While you are carrying out routine brake and chain adjustment, examine other components such as shock absorbers and wheels.

By the time you get to the track on race day, your machine should be tightened, tuned, and ready to ride, but there are some factors that can't be taken into account until you actually get to the track. The type of track and condition, along with the weather, may have to be taken into account when you make the final set up of your machine for the race.

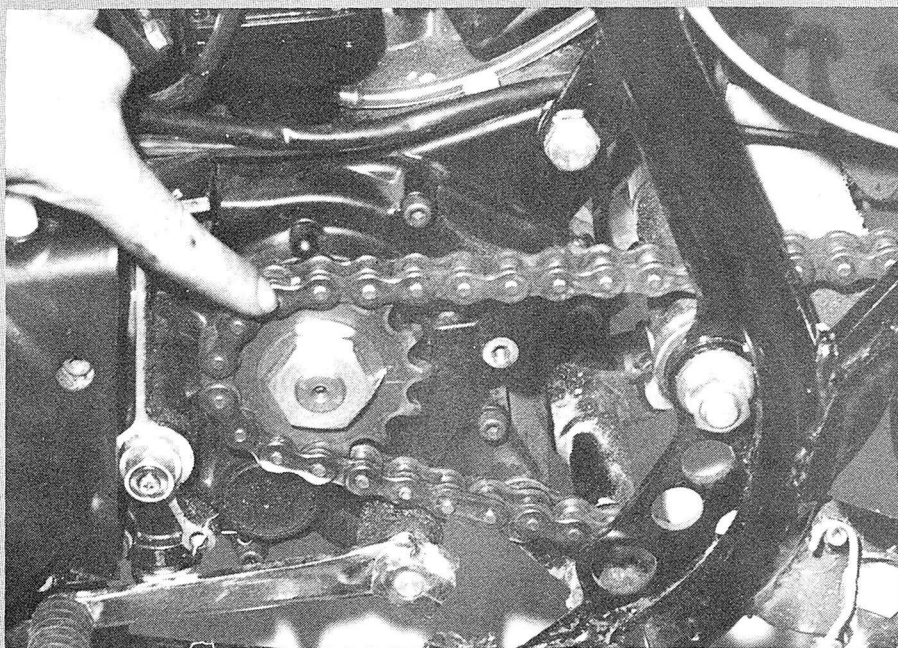
at the track tuning



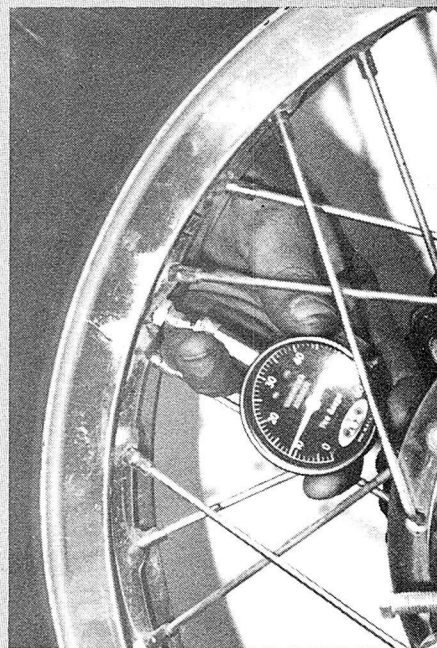
A selection of spark plugs in different heat ranges is handy for race day tuning. Use a hotter range plug to warm up the engine, and then switch to the colder range for racing.



The altitude and weather will dictate the main jet size that is needed. The main jet is carried in the bottom of the float bowl.



The local track conditions will determine the final gearing that will be needed. Most changes can be made by exchanging countershaft gears.



Tire pressures have an effect on the handling of your machine. Check the tire pressure of both tires and adjust them as needed after a few practice laps.



Since the introduction of the Yamaha Mini-Enduro late in 1970, a very exciting and serious sport of mini-motocross racing has developed and a bundle of very competitive machines have hit the market. With competition of this sort, you can expect the equipment to improve and the races to start to get tougher to win. Today, mini-motocross racing has just about all of the sophistication of the full sized

racing mods for the Yamaha mini

variety. In the serious areas of competition, a showroom stock machine, even a good one like the Yamaha Mini-Cross, hasn't got what it takes to bring home the bacon.

In the current quest for better performance from the Yamaha mini-motorcycles, Bill Butler, owner of Fun 'N Fast, Inc., of Northridge, California, is one of the acknowledged leaders. Bill has come up with a combination for mini racing that is not only fast, but strong and durable as well. The bike is based on the Yamaha GT-MX Mini-Cross, although extensive changes have been made.

The first step in putting together the ultimate all-out mini was to replace the stock frame with one of the new mini frames from Red Line Engineering, also located in Northridge, California. The Red Line frame is constructed of 4130 chromemoly tubing and its basic layout is very similar to the stock GT-MX frame. Like the stock frame, the Red Line unit features a single, large diameter backbone tube and a double-cradle design. The Red Line unit is designed to eliminate the flexing that can occur with the stock frame when it is subjected to the rigors of hard competition.

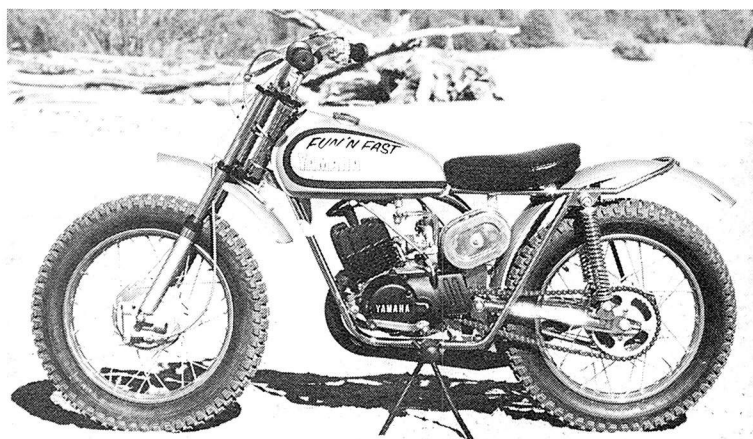
Another modification incorporated into the Red Line frame allows the engine

to be mounted one inch lower than the stock location. This results in a slightly lower center of gravity and improved handling. Also adding to the handling qualities of the frame is the rear swinging arm. The new swinging arm is one inch longer than the standard swinging arm increasing the wheelbase and the stability.

In the suspension department, several important changes were made. These changes began at the front end, where the front forks were modified using a handling improvement kit from Torque Engineering. The result is an extra inch of fork travel and much improved damping qualities. At the rear, the stock rear suspension units were replaced with Boge shocks, which are better suited for competition riding.

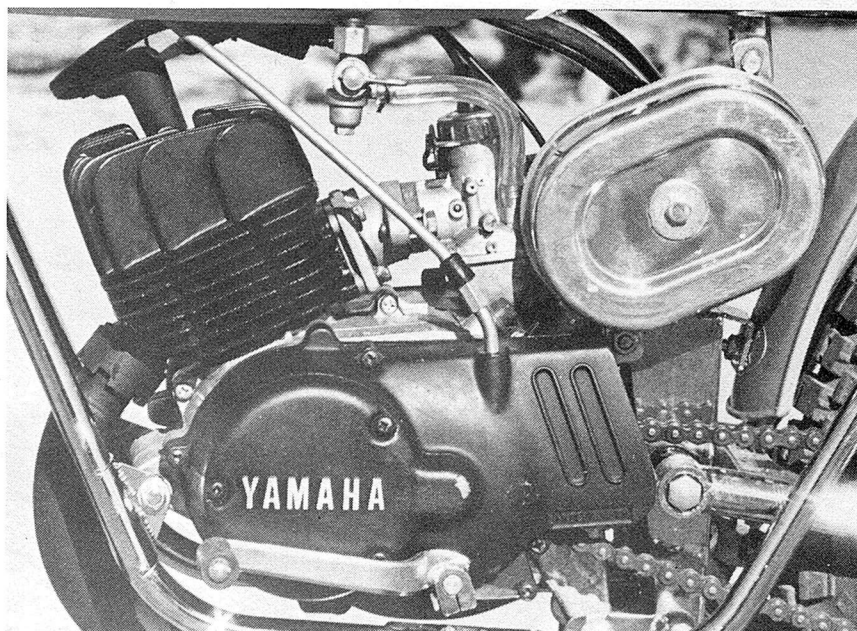
Rounding out the handling package are larger tires front and rear, and a larger rim for the back wheel. A fifteen-inch rim was laced to the stock rear hub replacing the original fourteen-inch unit. New 3.25-15 trials pattern tires were mounted front and rear to replace the original smaller tires. The stock fenders were also exchanged for the Preston Petty unbreakable units to remove a bit of weight and minimize damage in the event of a spill.

**IF YOU
ARE
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MINI
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INTERESTED IN.**

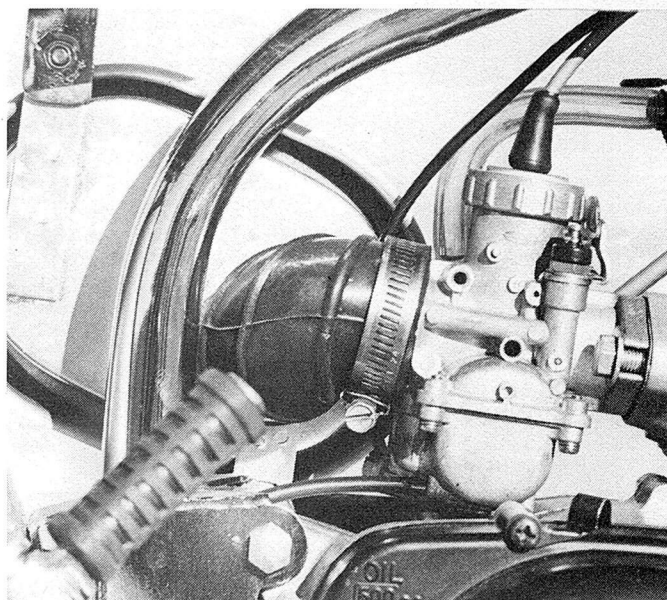


Sleek and race ready, the Fun'n Fast Yamaha gleams, the pride of any small fry racer.

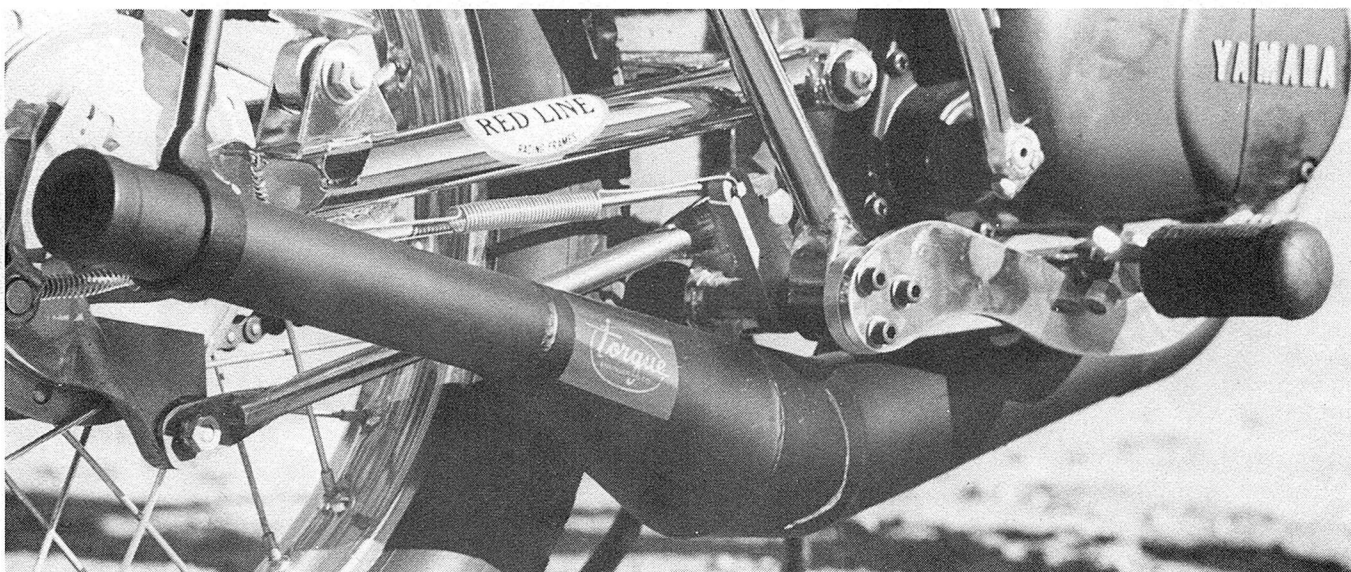
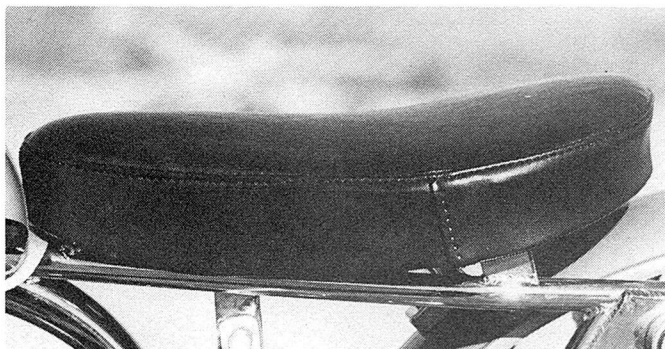
In its stock form, this Yamaha mill has tremendous potential as Butler demonstrated.



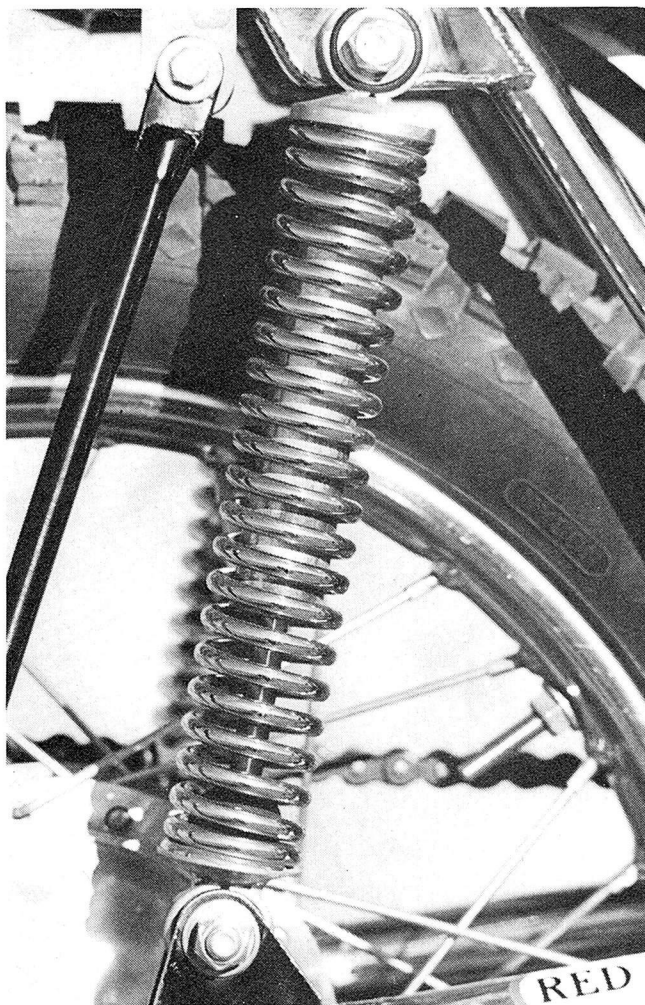
One of the big tricks is the Fun'n Fast manifold and air cleaner, which when mated to this 24mm Mikuni add greatly to the output of the powerplant.



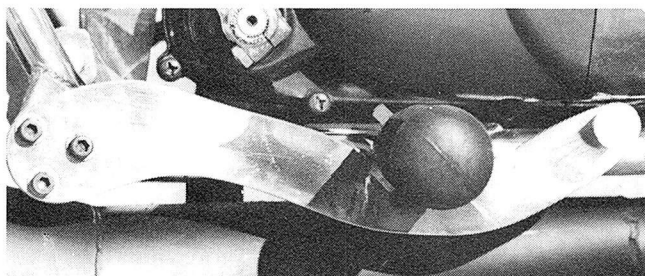
Solo saddle was handcrafted by a local upholsterer.



The muffled Torque Engineering minipipe sweeps low beneath the engine, but still offers adequate ground clearance.



Boge shock absorbers are very similar in appearance to the stock items. Performance, though, is much better.



Some of Butler's handiwork can be seen in this custom-made aluminum brake pedal.

Fenders are the popular Preston Petty flexible type.



With all of this handling available, it is only logical that the engine would receive some attention. Bill, with an extensive background in making Yamaha engines run stronger, came up with the right combination to make this mini run like a maxi. The whole process started with the head, which was milled .080-in. to produce a higher compression ratio. Next, the ports were cleaned, matched, and raised so that they remain open for a longer duration and allow a greater volume of fuel mixture to enter the cylinder. The stock reed valve assembly was retained, but to match the engine's new increased ability to breathe a larger carburetor was mounted.

Bill designed (and is now selling) an adapter kit that would allow a 24-mm Mikuni carburetor to be bolted onto the mini engine in place of its stock 16-mm unit. A large capacity Filtron air filter element is housed in a Fun 'N Fast air filter enclosure and attached to the new Mikuni with an intake hose from a Yamaha LT-MX.

The stock magneto in the mini engine left a bit to be desired on several counts, in terms of providing the spark for the mini's competition requirements. A simple solution was found in the form of a unit from the Suzuki line. Bill mounted a magneto from a Suzuki 90 GYT-kit engine. This Suzuki unit not only pumps out a hotter spark than the stock mini magneto, but reduces the rotating weight on the left side of the crankshaft by about 75 percent. A fact

which, in itself, should help the engine grab revs a bit quicker.

Topping off the engine modifications is a tuned expansion chamber from Torque Engineering. The expansion chamber runs down the frame well out of the way of the rider, but has plenty of clearance for motocross racing. In keeping with the current practice of reducing the noise level, the expansion chamber is designed with a silencer.

In spite of the extensive modifications at the top end, the bottom end of the Yamaha engine remains totally stock. Even though Bill estimates that the engine buzzes to 12,000 rpm and produces more than double its original horsepower output, the stock bottom end bearings, crankshaft, drive-train, and other components carry the load well.

The stock Autolube oiling system has been removed from the mini, partly for the reduction of weight, but primarily to minimize tuning problems and eliminate the possibility of having the engine's lubrication cut off by a broken oil line, damaged cable or other malfunction. Lubrication is now provided by a gas/oil solution, pre-mixed at a ratio of 20:1.

If you're serious about racing a mini in today's heads-up mini-motocross competition and winning, this is the kind of a setup you'll have to shoot for. First class performance demands first class equipment, and this is it. There's a lot of motorcycle packed into this mini package.





how to conquer the dirt

Riding in the dirt can be a great pastime for the motorcyclist, but some of the enjoyment is taken away if you spend half of your time with your nose in the ground and the other half avoiding terrain that you fear might put you there again. A few special riding skills are required for the dirt that are different from those used on the street, but nothing so difficult that the average rider can't master.

MASTERING A FEW BASIC SKILLS WILL OPEN UP A WHOLE NEW WORLD OF TRAIL RIDING PLEASURE FOR YOU.

The first step in mastering the dirt is to master the fundamentals of controlling your motorcycle. This means being able to stop and turn confidently in a variety of different conditions. These skills are so basic they often go unpracticed by the novice, who is anxious to get out there and start climbing hills.

Being able to stop in the dirt and maintain control of your bike can be tricky. The front wheel provides most of your stopping power, but many riders rarely use the front brake.



Turning at higher speeds is done with your weight planted toward the center of the bike. Lean into the turn, using your inside foot as a stabilizer.



Good protective clothing is essential. A helmet, boots, and gloves are essential for the dirt rider. Heavy pants and a long sleeved shirt or jacket will keep scrapes and scratches to a minimum.

The front brake should never be applied when the front wheel is turned and leaning to one side. But other than this, it is by far the safest, most controllable brake to use. Practice stopping, starting at slow speeds, and working up to faster ones. Get the feel of the situation. Only when you are confident about stopping, can you really be confident about the rest of your riding.

The next step is turning the motorcycle. Here, there are two basic techniques involved. One for very low speed turning and one for turning at higher speeds. In both, your own weight distribution plays an important role, as is the case with most maneuvers.

For very precise cornering at very low speeds, stand on the footpegs and lean the motorcycle into the turn, while swinging your body weight toward the outside of the turn. It may take a little practice to get everything coordinated. But once you've mastered the technique you will be able to ride around objects that would have forced you to stop before.

Cornering at higher speeds, on the other hand, is usually done in a seated position. In preparation for the corner, ease your weight forward a bit toward the middle of the machine. You should initiate the turn by leaning into it, rather than turning the handlebars into it. Put your inside foot out slightly toward the front, for stability, and lean your weight



Slow, tight turns are made standing on the pegs. Lean the motorcycle into the turn and shift your weight toward the outside.

When cresting a steep rise, keep your body more or less vertical. Gradually transfer your weight from the front to the rear as the bike starts down the other side.



When climbing over a short rise, keep your body roughly vertical, allowing the machine to follow the plane of the hill.

Climbing a long hill requires a combination of momentum, power, traction, and balance. Stand on the footpegs and shift your weight forward to keep the front down.





Dropping off a steep embankment requires balance and control. Stand on the pegs and push your weight far to the rear, allowing the front wheel to drop off easily and follow the terrain.

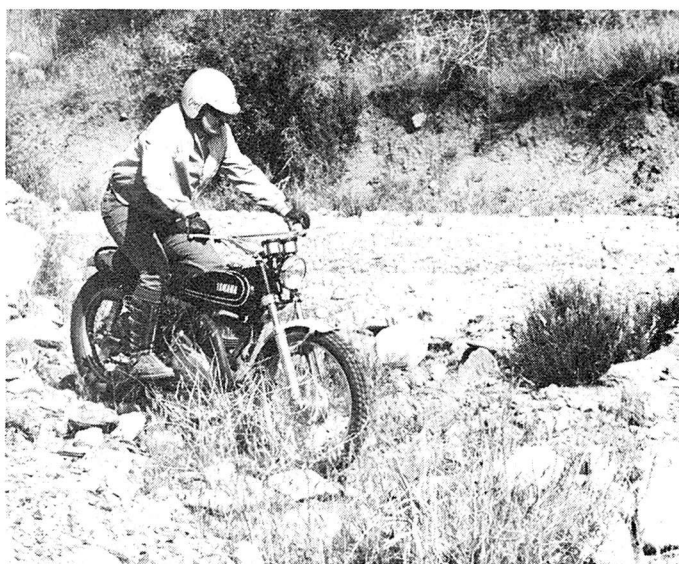
Sometimes it is necessary to be able to lift the front wheel over obstacles. This is done by moving your weight to the rear and catching a little extra throttle.



to the inside. The faster the corner, the more you will have to lean. You'll find with experience that you can control your line through the corner almost exclusively with the throttle and the positioning of your weight. Again, start at a reasonable speed and increase the speed as you master the basic techniques.

When you can safely stop and turn your bike at will, under a variety of conditions, you are ready to start tackling some of the obstacles that make dirt riding as challenging and enjoyable as it is. In most of these riding conditions, you will find that your weight placement plays an important role. Nowhere is that more true than in climbing hills.

Successfully topping a hill is usually a combination of several factors, including: balance; traction; power; and momentum. As you approach a hill, choose the best path to the top and make your approach for that path. Hit the base of the hill with as much speed as the surrounding terrain allows. Stand on the pegs and shift your weight forward to keep the front wheel down and the rear wheel biting. If you are forced to shift the transmission in the middle of the hill, don't wait until you have lost all of your momentum. Plan your shift so that you keep as much speed as possible. As you reach the crest of the hill ease back on the throttle and allow the momentum to carry you over the top under control. If you are not sure what's on the other side, be ready to turn off your machine at the last minute. Just because a hill has a path going up one side doesn't mean that there is a path going down the other side.



When entering a section of rough terrain, plan ahead. Pick your best path through the upcoming obstacles while you still have time to adjust your course.

For crossing mud or sand, keep the front end light. Get into the highest gear you can pull and keep your speed up.

Traversing a slope is done by keeping the motorcycle as close to vertical as possible. Move your weight to the downhill side and keep the throttle steady.

Riding over logs and large rocks is a simple matter once you get the hang of it. Again, stand up and move your weight to the rear. Approach the object as squarely as possible.





Always be prepared for the unexpected when you make a water crossing. Rocks or holes under the surface of the water may not be visible until you are on top of them.



Picking your way over rocky terrain requires balance and practice. Stand on the pegs and shift your weight to the rear, keeping the front end light.

There are few places that you can ride up a hill without making a trip down a hill as well. Down hills, probably more than any other thing, have the average trail rider buffaloed. Your position on most down hill runs should be standing on the footpegs with your weight shifted to the rear of the bike. Again, if possible, choose your path ahead of time. Keep your speed under control with light firm pressure on both the front and rear brakes. Most riders hesitate to use their front brake on down hill sections, but once you learn how it is by far the best one for the job. The main thing to remember here is that you should never apply the front brake when the front wheel is turned. If it is necessary to steer around something in the middle of the down hill path, release the brake lever first and wait until the wheel is straight again before reapplying it. As long as the front wheel is straight, the front brake can be used much harder than the rear brake might be. Applying the rear brake too hard going downhill can easily lock up the rear wheel and kill the engine; a situation to avoid. Not only this, when the rear wheel is locked up, it usually tends to slide. It is needlessly difficult to ride the hill when your rear wheel is trying to pass your front wheel.

These are some of the basics. In the accompanying photos we have attempted to illustrate the application of these basic techniques to the variety of situations that the average dirt rider might expect to face. Once you've mastered the techniques, there will be almost nothing that you and your motorcycle will not be able to face and conquer, which is what makes dirt riding the enjoyable sport that it is.



Stay alert when you are riding an unfamiliar trail. A sheer drop off may look the same as a gentle hump until you are right up to it.



WITH AN
ELECTRIC
STARTER
AND A
MODEST SIZE,

YAMAHA'S 125 ENDURO

**THIS IS
DEFINITELY
A FAMILY
TRAIL
BIKE.**

One of the earliest of the econ-enduros to appear in the United States made its presence known in the late '60s. It was from Yamaha and it took the still very popular 125cc form, which is as good today as it was then. Competition was mainly from the often exotic, but always troublesome European machinery. Besides

those machines with an Italian or Spanish accent were virtually impossible to obtain parts for, if you could find a dealer that is. So into this situation stepped Yamaha with their 125 Enduro known as the AT-1. What they gave the people who bought them was a trail-bike that could be ridden anywhere, offer fun type rid-

ing, and reasonable certainty that, if you didn't do something dumb, there'd be no reason for you to have to carry it back. The record speaks for itself, because the updated AT-3 version is still showing off its abilities.

A dual-purpose bike, the AT-3 is really more at home in its intended environment,



which is trail riding. Here it can be great fun, as you pick your way through rocks, chug or roar across sand, or give it the proper amounts of body english along a mountain trail. If you want to, it's possible to operate it in the 65 mph range, but this is near the AT-3's 7000 rpm red line. Streetability though, is really an added advantage. But to get the feeling of the AT-3, you've got to get it in the dirt.

As far as the new AT-3 is concerned, it's relatively unchanged from last year's ver-

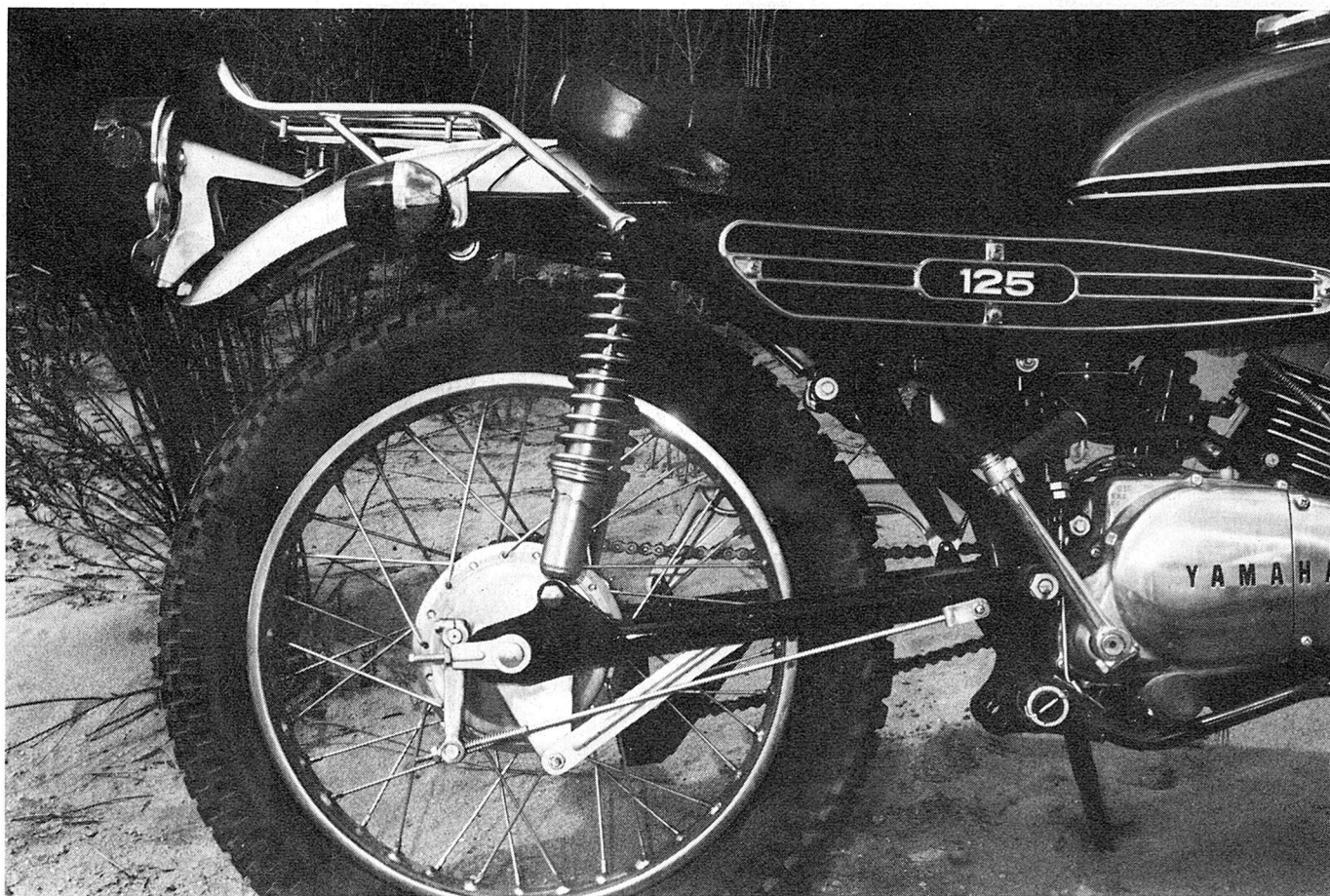
sion. That's when Yamaha went to a reed valve, which adds to the engine's efficiency. This year they've apparently been content to stick with some cosmetic dressing up. This is limited to paint and stripping, which is very tastefully done and adds considerably to the overall impression given by Yamaha's 125 Enduro.

Handling in a motorcycle like the AT-3, or any other for that matter, will either make or break it. Fortunately, in the case of the AT-3, it's a pretty

good performer in this department. That is if you happen to be the right sort of person, which has nothing to do with your pedigree, how you treat animals, your bathing habits or much else. What it has to do with is your weight, with those on the low side of 150 pounds being favored by the AT-3. For these people, the suspension seems quite well tuned. That is, everything is working well without being unduly stressed. On the other hand, if you happen to be on the high side of 150 pounds, you will find

For a dual purpose bike, the 125 Enduro is at home on the pavement or in the dirt. This is a bike to grow with.

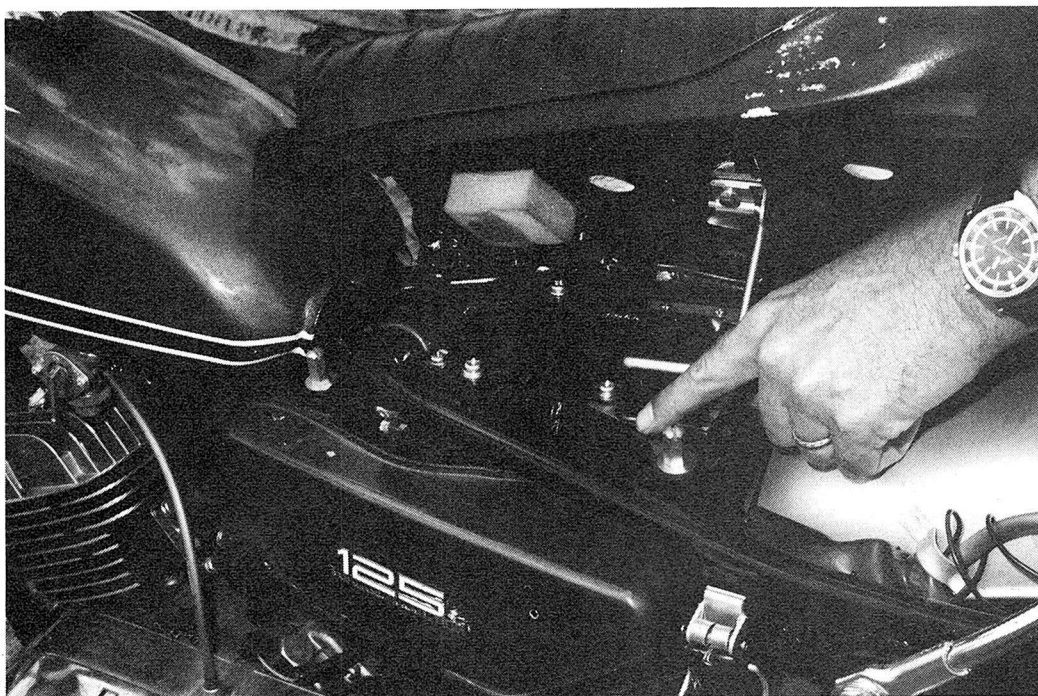
This engine cranks out 13 hp
and can operate in the 65
mph range.



The rider should be on the
low side of 150 lb., otherwise
dampening abilities begin to
fail.

that the dampening capabilities deteriorate proportionately with your bulk.

What happens is that as soon as you exceed the capabilities of the suspension, you're notified by the appropriate crashing and banging sounds that come from an overwrought suspension. Of course this can be remedied, at least to some extent, by adding a heavier oil to the front fork tubes. It's also an easy manner to change the rear shocks so



Note the easy access oil filler cap. Also, the bike comes with Yamaha's own Torque Induction system.



Stock 125 Enduro comes with a luggage rack and safety side reflectors.

that the aft end is a bit stouter.

The riding positions aboard the AT-3 will please most riders. Seating position is good, as is its relationship to the handlebars and footpegs. They all combine to let you make the most of the right amount of body english, when conditions call for it. Even more so, they make the 125cc Enduro a fun bike to ride, which is what the whole thing's all about.

With 13 horses on tap, the

AT-3 utilizes its five-speed transmission to the fullest, as you can go virtually anywhere. Low gear has a ratio of 35.45:1, making it something of the proverbial stump puller in the lower cog. Still, there's a good amount of high speed ability in the Yamaha Enduro. All you have to do to get it is turn the wick up.

As far as lightweight dirt bikes are concerned, you'll have to look some time before you find a better value than

Yamaha's AT-3. Not that it's without its faults, after all no one is perfect. But the little Yamaha comes closer than most to this mythical standard. The AT-3 is a bike that you can grow with and at the same time, it's one that's not going to bore you as experience mounts. In short, you'll find that this 125cc machine is one of the best little trailbikes to come along in some time. And don't forget, the price is right.



TESTING THE 175 ENDURO

There will undoubtedly be those who frown at the thought of any form of compromise, but it does seem to be the way with most things in this world. It's a good thing too, because you're able to get some of the finest from both sides. This applies to Yamaha's 175cc CT-3. It combines most of the lightweight agility of a 125cc machine along with most of the power and performance of a 250cc bike. In a sense it's the best of both classes of machines.

Besides being lightweight and having more than ample power, the CT-3 also possesses some compact dimensions with a wheelbase of 50.8 inches. This is something to keep in mind when you're looking for a bike that will fit comfortably inside a van or the bed of one of those mini pickup trucks. Nor does it have to be wrestled about like most bigger bikes, either off the truck or on the trail. This alone is well worth the price of admission, if you've ever had to pull a bike up from someplace like the Anza-Borrego fish creek drop-off.

The frame and suspension is much the same as what you'd find on the Yamaha 125cc, but with a little extra "beef" added here and there. There's a bash plate fitted to the downtubes for added engine protection, even though ground clearance is very generous. In fact most manufacturers probably wouldn't bother with one, but it's good to see that Yamaha did. No matter how high the engine and other vitals are, you know that sometime you're going to come crashing down on a very well placed boulder.

Other points receiving attention have been the wheels and hubs, which Yamaha has machined a little differently than in the past. This is to eliminate the problem of spoke breakage that has

100/WILD WORLD OF YAMAHA

